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# **FIELD MAINTENANCE PRINT SET**

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# MS780

## **Field Maintenance Print Set**

# Digital Equipment Corporation

PRINT SET ORDER NO.  
MP00498

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## DRAWING DIRECTORY

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### UNIT VARIATIONS

VAR	TITLE
MS780-AA	128K BYTE MEM AND CONTROL 2 M8211, M8212, M8213, M8214 AND SPACE FOR 7 MORE MS780-B H7100-A POS, H7102 H7103 REG. 115V 50/60 Hz
MS780-AB	MS780-AA EXCEPT H7100-B P.S. 230V AC 50/60 Hz
MS780-BA	128K BYTE EXPANSION 2 M8211
MS780-CA	256KB MEM AND CONTROL M8210 M8212, M8213, M8214 AND SPACE FOR 15 MORE MS780-D H7100-A POS, H7102, H7103 REG. 115V 50/60 Hz
MS780-CB	MS780-CA EXCEPT H7100-B. P.S. 230V AC 50/60 Hz
MS780-DA	256K BYTE EXPANSION M8210
MS780-DB	512K BYTE EXPANSION M8210
MS780-DC	1024K BYTE EXPANSION M8210
MS780-DD	2048K BYTE EXPANSION M8210
MS780-CC	SAME AS MS780-CA EXCEPT WITH 512KB MEM, 2-M8210 + SPACE FOR 14 MORE MS780-D
MS780-CD	SAME AS MS780-CB EXCEPT WITH 512KB MEM, 2-M8210 + SPACE FOR 14 MORE MS780-D

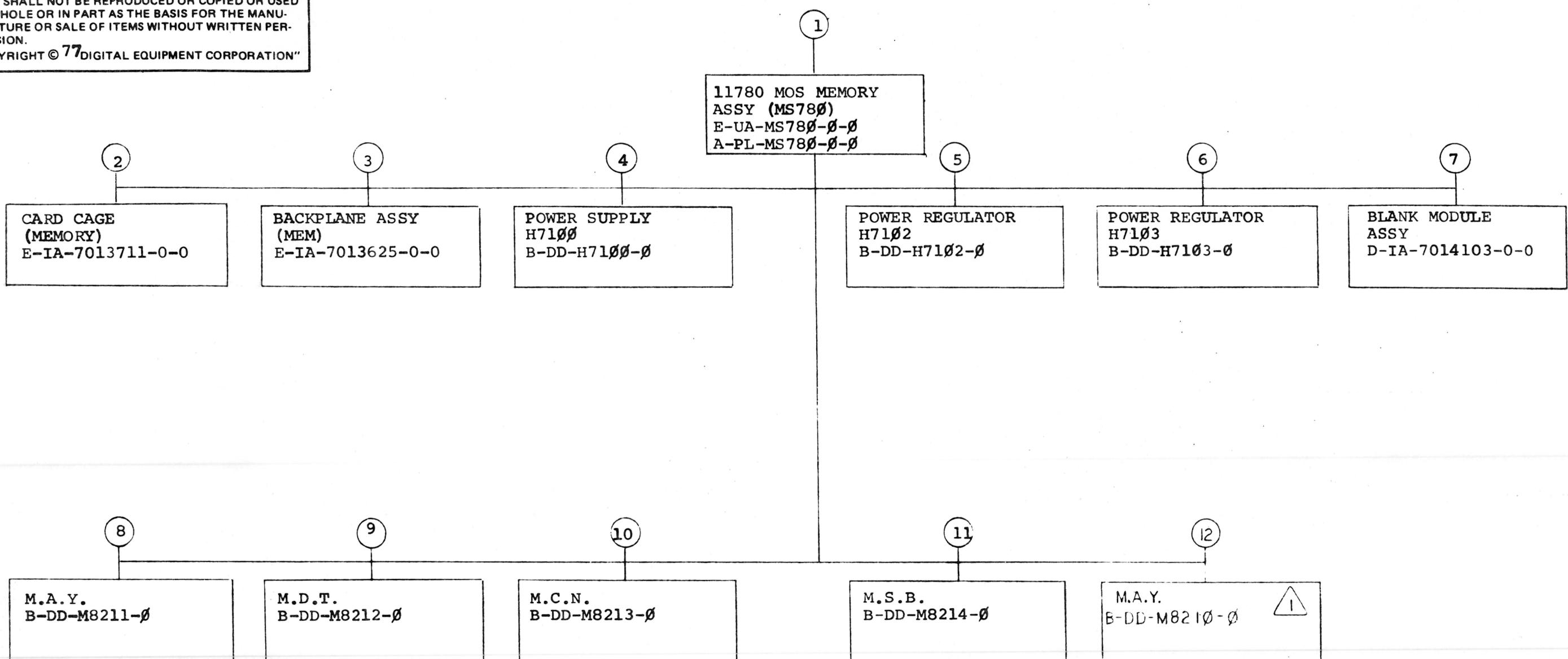
⚠ MS780-BA & MS780-DA CANNOT BE INTERMIXED IN THE SAME BACKPLANE.

REVISIONS	CHANGE NO.	REV.	A	B	C	D
P.R.	MS780-1					
P.C.	MS780-2					
	MS780-TW3					
	MS780-TW5					

USED ON OPTION/MODEL	DRN.	DATE	TITLE			SIZE	CODE	NUMBER	REV.
			11780	P. BOUDREAU	Sep 77				
	CHK'D.	DATE							
	D. HEALY	NOV 77							
	PROJ. ENG. <i>Peter Healy</i>	DATE 15 Nov 77							
	PROD. <i>Grant Lee</i>	DATE 11/17/77							
SHEET 1 OF 3						DIST.			

digital

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⚠ M8211(64K BYTE) CANNOT BE INTERMIXED WITH THE M8210 (256K BYTE) IN THE SAME BACKPLANE.

FIND NO.	DRAWING NO.	DESCRIPTION	TYPE	FIND NO.	DRAWING NO.	DESCRIPTION	TYPE
1	MP00498	11780 MOS MEMORY ASSY (MP)	-		K-WL-7013625-0-1	WIRE LIST (MEM)	E/M
	B-TC-MS780-0-1	11780 MOS MEMORY ASSY (TC)	-		A-WT-7013625-0	A.W.T. REV. STATUS	E/M
	E-UA-MS780-0-0	11780 MOS MEMORY ASSY (MS780)	E/M		A-DC-7411881-0-0	DECAL A.W.T. REV. STATUS	M
	A-PL-MS780-0-0	11780 MOS MEMORY ASSY (MS780) (PL)	E/M				
	B-IA-7418724-0-0	PLATE, STUD P.C. BOARD	M				
	B-MD-7418738-0-0	PLATE, P.C. BOARD	M				
	B-MD-7419484-0-0	COVER MEMORY	E/M				
	D-IA-7014234-0-0	CABLE +5B AND +12	E/M				
	D-IA-7014212-0-0	CABLE, AC, DC LO	E/M				
	D-IA-7014529-0-0	CABLE, +5 MEMORY (RED)	E/M				
	D-IA-7014250-0-0	CABLE, POWER RTR MEMORY (BLACK)	E/M				
	D-IC-11780-0-1	11780 SYSTEM POWER DIAGRAM	E				
	D-IC-11780-0-2	11780 SYSTEM INTERCONNECT DIAGRAM	E/M				
	D-IC-11780-0-3	11780 SUB SYSTEM INTERCONNECT	E/M				
	D-MU-MS780-0-2	MS780 MODULE UTILIZATION MOS MEMORY	E/M				
	D-BD-MS780-0-3	MS780 MOS MEMORY BLOCK DIAGRAM	E				
	D-TD-MS780-0-4	MS780 MOS MEMORY TIMING DIAGRAM	E				
	D-FD-MS780-0-5	MS780 MOS MEMORY FLOW DIAGRAM	E				
	C-MD-7419454-0-0	COVER, MEMORY BACKPLANE	M				
	D-IA-7014213-0-0	CABLE, OVER TEMP.	E/M				
	E-AD-7014957-0-0	SUPPLY, MEMORY OPTION	E/M				
2	E-IA-7013711-0-0	CARD CAGE (MEMORY)	M				
	C-MD-7417930-0-0	MOUNTING BAR VERTICAL	M				
	C-MD-7417914-0-0	BRACKET BOTTOM REAR	M				
	C-MD-7417910-0-0	BRACKET CARD GUIDE	M				
	C-MD-7417912-0-0	BRACKET BOTTOM CARD GUIDE	M				
	C-MD-7417911-0-0	BRACKET TOP CARD GUIDE	M				
	C-MD-7417942-0-0	HANDLE CARD CAGE	M				
	C-MD-7418194-0-0	STIFFENER	M				
	C-MD-7418181-0-0	STIFFENER CORNER	M				
	C-MD-7417913-0-0	BRACKET TOP REAR	M				
3	E-IA-7013625-0-0	BACKPLANE ASSY (MEM)	E/M				
	E-MD-5012465-0-0	ETCH CIRCUIT BOARD	E/M				
	C-MD-7417867-0-0	BAR MOUNTING	M				
	A-SP-7013625-0-0	PROCESS SPEC	E/M				

TYPE: E ELECTRICAL  
M MECHANICAL  
E/M ELECTRO/MECHANICAL

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TITLE 11780 MOS MEMORY ASSY (MS780) SHEET 3 OF 3 SIZE B DD NUMBER MS780-0 REV D

NOTES: (PERTAIN TO SHEET 1 ONLY)

- CARD GUIDE TO BE INSTALLED AS FOLLOWS: ITEM 15 IN ALL ODD ROWS 1,3,5 ETC ITEM 16 IN ALL EVEN ROWS 2,4,6 ETC.
- FOR SYSTEM INTERCONNECTION SEE D-IC-11780-0-3
- FOR SYSTEM CABLE INTERCONNECTION SEE D-IC-11780-0-2
- FOR SYSTEM A/C INTERCONNECTION SEE D-IC-11780-0-1
- FOR M5780 MODULE UTILIZATION SEE D-MU-M5780-0-0
- FOR ORIENTATION OF POWER SUPPLY & REGULATOR SEE D-MU-M5780-0-0
- FOR SYSTEM EXPANSION REFER TO D-MU-M5780-0-2.
- OPTION MOUNTING HARDWARE FOR INSTALLATION REF E-UA-11780-0-0

MS780-DD 2 MB EXPANSION  
8-M8210

NUMBER	VARIATION
MS780-CC	512 KB MEMORY-CONT. 2-M8210, M8212, M8213, M8214 & SPACE FOR 14 MORE MS780-DA H7100-A.P.S. H7102 H7103 REG. 120V AC 50/60 Hz
MS780-CD	SAME AS MS780-CA EXCEPT H7100-B.P.S. 240V AC 50/60 Hz
MS780-AB	MS780-AA EXCEPT H7100-B.P.S. 230V.AC. 50/60Hz
MS780-BA	128K BYTE EXPANSION 2-M8211
MS780-CA	256KB MEMORY & CONTR 1-M8210, M8212, M8213, M8214 & SPACE FOR 15 MORE MS780-DA H7100-A.P.S., H7102 H7103 REG 115V.A.C. 50/60 Hz
MS780-CB	SAME AS MS780-CA EXCEPT H7100-B.P.S. 230V.AC. 50/60 Hz
MS780-DA	256KB EXPANSION 1-M8210
MS780-DB	512 KB EXPANSION 2-M8210
MS780-DC	1 MB EXPANSION 4-M8210

SECTION A-A  
SCALE 1/1  
TYP 2 PLACES

FOR PARTS LIST SEE A-PL-MS780-0-0

ITEM NO.	DESCRIPTION	DRAW/PART NO.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
APLIES TO	CLASS OF ACCURACY	NOMINAL DIMENSION IN INCHES
4-30"	CLASS 1	0.000 0.000 0.000 0.000
SURFACE QUALITY	CLASS 2	0.000 0.000 0.000 0.000
IN	CLASS 3	0.000 0.000 0.000 0.000
MICROINCHES	PREFERRED	0.000 0.000 0.000 0.000
DRILL	FIRST USED ON	0.000
CHAMFER	0.000	0.000
END MIL	0.000	0.000
PROL. ENCL.	0.000	0.000
PROD. VER.	0.000	0.000
NEXT HIGHER ASY.		
REMOVED DURING ASY BREAK SHARP CORNERS		
DO NOT SCALE THIS		
MATERIAL		
SEE PARTS LIST		
PRINTED		

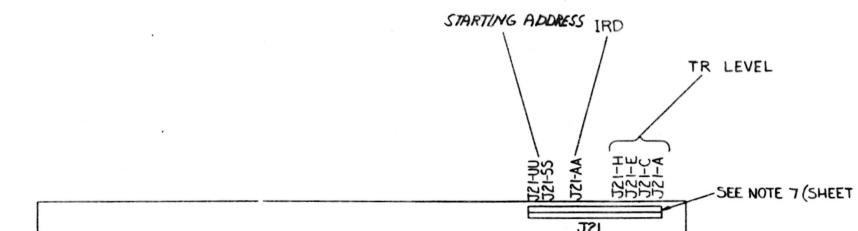
NOTES: (PERTAINS TO SHEET \*2 ONLY.)

1. I → JUMPER PLACED ACROSS PAIR OF PIN DESIGNATED.  
→ NO JUMPER.
2. BACKPLANE SLOT DESIGNATION:  
EXAMPLE: CA2 C=CONN. BLOCK, A=FINGER  
2=SIDE
3. N.C. MEANS NO CONNECTION TO THAT SLOT.
4. JIG IS CONNECTED ONLY IF TRM BOARD (M9040) IS IN SLOT #1.
5. MEMORY TIMING SEQUENCE SHOWS POWER TURN ON + TURN OFF ORDER ONLY. IT DOES NOT INDICATE RELATIVE TIME RELATIONSHIPS. THIS TIMING IS FOR A NON BATTERY BACKED UP SYSTEM.
6. MEMORY CONFIGURATION GUIDELINES:  
 A. ALL BACKPLANES COME FROM MANUFACTURING CONFIGURED AS MEMORY CONTROLLER #1.  
 B. ROM BOOTSTRAP WILL ALWAYS BE ON MEMORY CONTROLLER #1.  
 C. MEMORY CONTROLLER WITH ROM BOOTSTRAP IS SYSTEM CRITICAL AND WILL ACTIVATE FAIL ON POWER DOWN.  
 D. MEMORY CONTROLLERS WITHOUT ROM, ARE NOT SYSTEM CRITICAL AND WILL USE ALERT MECHANISM FOR CHANGE IN POWER STATUS.  
 E. MEMORIES WILL TYPICALLY BE HIGHEST PRIORITY ON THE BUS.  
 F. STARTING ADDRESS STRAPPING IS ONLY USED BY THE MEMORY ON COLD POWER UP SO EACH MEMORY ASSUMES SOME UNIQUE PREDEFINED ADDRESS. ACTUAL OPERATING STARTING ADDRESS IS LOADED BY THE SOFTWARE TO EACH MEMORY CONTROLLER.  
 G. INTERLEAVED MEMORY CONTROLLERS MUST BE CONTIGUOUS BUS TR LEVELS. THEY MUST ALSO HAVE THE SAME STARTING ADDRESS AND ARRAY SIZE. ON COLD POWER UP, INTERLEAVE BIT IS CLEARED. INTERLEAVE BIT IS SET BY THE SOFTWARE.  
 H. ONLY TWO WAY INTERLEAVING IS ALLOWED. WITH FOUR CONTROLLERS, CONTROLLERS 1+2 COULD BE INTERLEAVED AND CONTROLLERS 3+4 COULD BE INTERLEAVED.  
 I. 14 SPARE JUMPERS NOT USED AT THIS TIME.

TYPICAL MEMORY CONFIGURATIONS

MEMORY CONTROLLER NO	BUS TR LEVEL	FAIL STRAPPING	IRD STRAPPING JUMPS	SA STRAPPING
1	1	W	—	Ø
2	2	—	I	4 MEGABYTE
3	3	—	I	8 MEGABYTE
4	4	—	I	12 MEGABYTE

SEE NOTE 6 (SHEET 2)



STARTING ADDRESS STRAPPING

J21	ADDRESS	MEMORY CONTROLLER STARTING ADDRESS AFTER COLD POWER UP ONLY
—	—	Ø MEGA BYTE
—	I	4 MEGA BYTE
I	—	8 MEGA BYTE
I	I	12 MEGA BYTE

FAIL STRAPPING:

W → BACKPLANE WIRE FROM D20B2 TO C20V2 ALLOWS THE MEMORY TO ACTIVATE THE BUS SBI FAIL L SIGNAL FOR POWER FAILING CONDITION.

→ NO BACKPLANE WIRE BETWEEN D20B2 AND C20V2. MEMORY WILL NOT ACTIVATE BUS SBI FAIL L.

IRD STRAPPING: (INHIBIT ROM DECODE)

I → JUMPER PLACED ACROSS PAIR OF PINS, READ COMMANDS TO ROM ADDRESSES RECEIVE NO RESPONSE AND ARE NOT INITIATED. MEM USES ALERT FOR POWER STATUS.  
→ NO JUMPER. READ COMMANDS TO ROM ADDRESSES RECEIVE NORMAL CONFIRMATION AND CYCLE IS INITIATED. MEMORY DOES NOT USE ALERT FOR POWER STATUS.

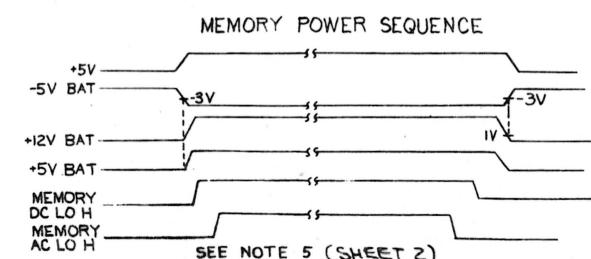
TR LEVEL STRAPPING

BACKPLANE WIRE		BUS TR LEVEL
—	—	F20C1
—	I	F20D1
—	I	F20E1
—	I	F20F2
—	—	F20H2
—	I	F20J1
—	I	F20J2
I	I	F20M1
I	—	F20N1
I	—	F20P1
I	—	F20P2
I	I	F20S2
I	—	F20T2
I	I	F20U1
I	I	F20U2

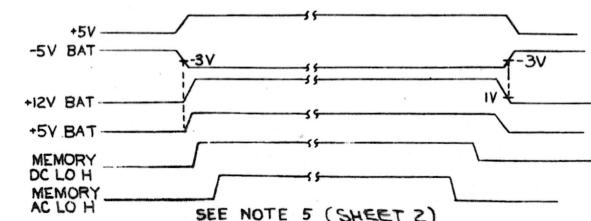
SEE NOTE 1 (SHEET #2)

VOLTAGE OR SIGNAL	INPUT CONN PIN	BACKPLANE SLOT NUMBER																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
J14-1,2 +5V BAT	J14-3,4	N.C.	CA2 CVI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	CA2 CVI	—	N.C.	CA2 CVI	DA2, DVI				
J17-2,3 +12V BAT	—	N.C.	AS1, FD2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	AS1, FD2	N.C.	N.C.	N.C.	—				
J17-1,4 -5V BAT	W3-1 W4-1	N.C.	BL2, EK1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	BL2, EK1	N.C.	N.C.	N.C.	—				
-52V	W5-1 W6-1	EK1	N.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N.C.	EK1	—	—	—				
+5V	W1-1	AA2 AVI BA2 BV1 EA2 EV1 FA2 FY1	N.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	AA2 AVI BA2 BV1 EA2 EV1 FA2 FY1	N.C.	AA2 AVI BA2 BV1 EA2 EV1 FA2 FY1	AA2 AVI BA2 BV1 EA2 EV1 FA2 FY1	AA2 AVI BA2 BV1 EA2 EV1 FA2 FY1				
MEMORY AC LO	W8-1	CR1	N.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	FE2	—				
MEMORY DC LO	W7-1	DE2	N.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NC	FT2	FR2	—				
CLOCKS AC LO	W2-1	CR2	N.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NC	—				
CLOCKS DC LO	W1-1	DE1	N.C.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NC	—				
GND	J16-3 J17-5,6 J17-8,9 J17-11,12 J19-2 J20-3	CONNECTIONS MADE TO THE FOLLOWING PINS IN EACH SLOT:	AC2	AH1	AN2	AT1	BC2	BH1	BN2	BT1	CC2	CH1	CN2	CT1	DC2	DH1	DN2	DT1	EC2	EH1	EN2	ET1	FC2	FH1	FN2	FT1

SEE NOTES 2,3 & 4 (SHEET #2)



MEMORY POWER SEQUENCE



SEE NOTE 5 (SHEET 2)

**DIGITAL EQUIPMENT CORPORATION**  
MAYNARD, MASSACHUSETTS  
**PARTS LIST**

MADE BY	W. FISHER	CHECKED	D. HEALY	SECTION
DATE	6 JUL 77	DATE	28 JUL 77	1
ENG	R. Fisher	PROD	R. Fisher	ISSUED SECT.
DATE	19 Sept 77	DATE	11/4/77	1

ITEM NO.	DWG NO./PART NO.	DESCRIPTION	QUANTITY VARIATION										
			MS780-AA	MS780-AB	MS780-BA	MS780-CA	MS780-CB	MS780-DA	MS780-DB	MS780-DC	MS780-DD	MS780-CC	MS780-CD
1	E-UA-7013711-0-0	CARD CAGE (MEMORY)	1	1	-	1	1	-	-	-	-	1	1
2	3614746-00	LABEL, MODULE UTILIZATION MS780	1	1	-	1	1	-	-	-	-	1	1
3	E-IA-7013625-0-0	BACKPLANE ASSY (MEMORY)	1	1	-	1	1	-	-	-	-	1	1
4	E-AD-7014957-00	MEMORY OPTION POWER SUPPLY 115V AC	1	-	-	1	-	-	-	-	-	1	-
5	E-AD-7014957-01	MEMORY OPTION POWER SUPPLY 230V AC	-	1	-	-	1	-	-	-	-	1	-
6	D-IA-7014103-0-0	BLANK MODULE ASSY	15	15	-	16	16	-	-	-	-	15	15
7	E-UA-M8211-0-0	MAY (MEMORY ARRAY)	2	2	2	-	-	-	-	-	-	-	-
8	E-UA-M8212-0-0	MDT (MEMORY DATA PATH)	1	1	-	1	1	-	-	-	-	1	1
9	E-UA-M8213-0-0	MCN (MEMORY CONTROLLER)	1	1	-	1	1	-	-	-	-	1	1
10	E-UA-M8214-0-0	MSB (MEMORY SBI INTERFACE)	1	1	-	1	1	-	-	-	-	1	1
11	B-MD-7419484-0-0	COVER MEMORY	2	2	-	2	2	-	-	-	-	2	2
12	9006043-01	SCR PH HD PAN #8 - 32 x 1.00	6	6	-	6	6	-	-	-	-	6	6
13	9006660-00	WASH., FLAT .38 o.d. x .19 i.d. x .06	6	6	-	6	6	-	-	-	-	6	6
14	9006563-00	NUT, KEP #8 - 32	6	6	-	6	6	-	-	-	-	6	6
15	1212405-00	CARD GUIDE SINGLE (NATURAL)	20	20	-	20	20	-	-	-	-	20	20
16	1212405-01	CARD GUIDE SINGLE (MAGENTA)	20	20	-	20	20	-	-	-	-	20	20
17	1211630-00	CARD GUIDE	8	8	-	8	8	-	-	-	-	8	8
18	9006611-00	NUT, CAP RELOCK 1/4 - 20	4	4	-	4	4	-	-	-	-	4	4
19	9006071-01	SCR, PH HD PAN#10-32 X .375	4	4	-	4	4	-	-	-	-	4	4
20	9007906-00	WASHER, LOCK SPLIT #10	4	4	-	4	4	-	-	-	-	4	4
21	3613281-04	LABEL, ADHESIVE BACKED PRINT (20 SLOT)	2	2	-	2	2	-	-	-	-	2	2
22	3614744-00	LABEL, WARNING MS780	1	1	-	1	1	-	-	-	-	1	1

TITLE	11780 MOS MEMORY ASSY (MS780)	ASSY NO.		SIZE	CODE	NUMBER	REV	ECO NO.
		E-UA-MS780-0-0		A	PL	MS780-0-0	F	MS780-TW006

DEC FORM  
DRA 110

Tw

**DIGITAL EQUIPMENT CORPORATION**  
MAYNARD, MASSACHUSETTS  
**PARTS LIST**

MADE BY	W. FISHER	CHECKED	D. HEALY	SECTION
DATE	6 JUL 77	DATE	28 JUL 77	1
ENG	R. Fisher	PROD	R. Fisher	ISSUED SECT.
DATE	19 Sept 77	DATE	11/4/77	1

ITEM NO.	DWG NO./PART NO.	DESCRIPTION	QUANTITY VARIATION										
			MS780-AA	MS780-AB	MS780-BA	MS780-CA	MS780-CB	MS780-DA	MS780-DB	MS780-DC	MS780-DD	MS780-CC	MS780-CD
23	9006037-03	SCR, TRUS, PHIL#8-32 X .375	7	7	-	7	7	-	-	-	-	7	7
24	9006634	WASHER, INT TOOTH #8	1	1	-	1	1	-	-	-	-	1	1
25													
26	A-PL-H7102-0-0	H7102 REGULATOR	1	1	-	1	1	-	-	-	-	1	1
27	A-PL-H7103-0-0	H7103 REGULATOR	1	1	-	1	1	-	-	-	-	1	1
28	D-IA-7014234-1E-0	CABLE ±5B and ±12	1	1	-	1	1	-	-	-	-	1	1
29	D-IA-7014212-1C-0	CABLE AC, DC LO	1	1	-	1	1	-	-	-	-	1	1
30	D-IA-7014529-0K-0	CABLE POWER +5 MEMORY (RED)	2	2	-	2	2	-	-	-	-	2	2
31	D-IA-7014250-0K-0	CABLE POWER RTR MEMORY (BLACK)	2	2	-	2	2	-	-	-	-	2	2
32	1214314	JUMPERS	5	5	-	5	5	-	-	-	-	5	5
33	9007797-00	WASHER, LOCK, SPLIT	4	4	-	4	4	-	-	-	-	4	4
34	9006566-00	NUT, HEX, 1/4 - 20	4	4	-	4	4	-	-	-	-	4	4
35	B-IA-7418724-0-0	PLATE, STUD P.C. BOARD	2	2	-	2	2	-	-	-	-	2	2
36	B-MD-7418738-0-0	PLATE, P.C. BOARD	2	2	-	2	2	-	-	-	-	2	2
37	C-MD-7419454-0-0	COVER, MEMORY BACKPLANE	1	1	-	1	1	-	-	-	-	1	1
38	3615087-02	LABEL, DANGER	1	1	-	1	1	-	-	-	-	1	1
39	1700087-00	COAX RIBBON CABLE (SBI) (4 IN)	6	6	-	6	6	-	-	-	-	6	6
40	7014213-0K	CABLE, OVER TEMP.	1	1	-	1	1	-	-	-	-	1	1
41	9008072-00	WASHER, LOCK EXT TOOTH #8	6	6	-	6	6	-	-	-	-	6	6
42	E-UA-M8210-0-0	MAY (MEMORY ARRAY)	-	-	-	1	1	1	2	4	8	2	2
43	9006646	WASHER, FLAT	2	2	-	2	2	-	-	-	-	2	2
44	3614743-00	LABEL, MEMORY POWER SUPPLY	1	1	-	1	1	-	-	-	-	1	1

TITLE	11780 MOS MEMORY ASSY (MS780)	ASSY NO.		SIZE	CODE	NUMBER	REV	ECO NO.
		E-UA-MS780-0-0		A	PL	MS780-0-0	F	

DEC FORM  
DRA 110

Tw

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NOTE:

\*=OR BLANK BOARD

△ ONLY USE WHEN NO SFT ON FAR END OF BUS. OTHERWISE USE BLANK BOARD.

▲ BASIC SYSTEM USES 128K-BYTE OR 2 M8211 BOARDS (SLOTS 17 & 16). THE BALANCE OF THE M8211 SLOTS SHOULD BE BLANK BOARDS. FOR LARGER MEMORY, REPLACE BLANK BOARDS WITH M8211 CONTINUOUSLY FROM SLOT 15 TO DESIRED SLOT FOR MAXIMUM MEMORY DESIRED. SLOT 2 IS THE LAST THAT WILL ACCEPT AN M8211.

D

A

B

C

B

D

E

F

A

REVISIONS	
CHNk	REV.
7C	M5780-0-2W004 A
E. Anton	Rev. 4.0 - c-2B
E. Anton	8/30/70

3840KB	3584KB	3328KB	3072KB	2816KB	2560KB	2304KB	2048KB	1792KB	1536KB	1280KB	1024KB	768KB	512KB	256KB	0KB
TO	TO	TO	TO												
4096KB	3840KB	3584KB	3328KB	3072KB	2816KB	2560KB	2304KB	2048KB	1792KB	1536KB	1280KB	1024KB	768KB	512KB	256KB

DRN. AFM	10-103	FIRST USED ON	VAX 11780	Digital
CHK'D	Regeles	10-103		
ENG.	Regeles	10-103		
PROJ. ENG.	Regeles	10-103		
PROD. ENG.	Regeles	10-103		
NEXT HIGHER ASSY.				
B-DO-M5780-0		SIZE CODE		
SCALE	H	NUMBER	D M5780-0-2	REV. A
SHEET	1 OF 1	DIST.		

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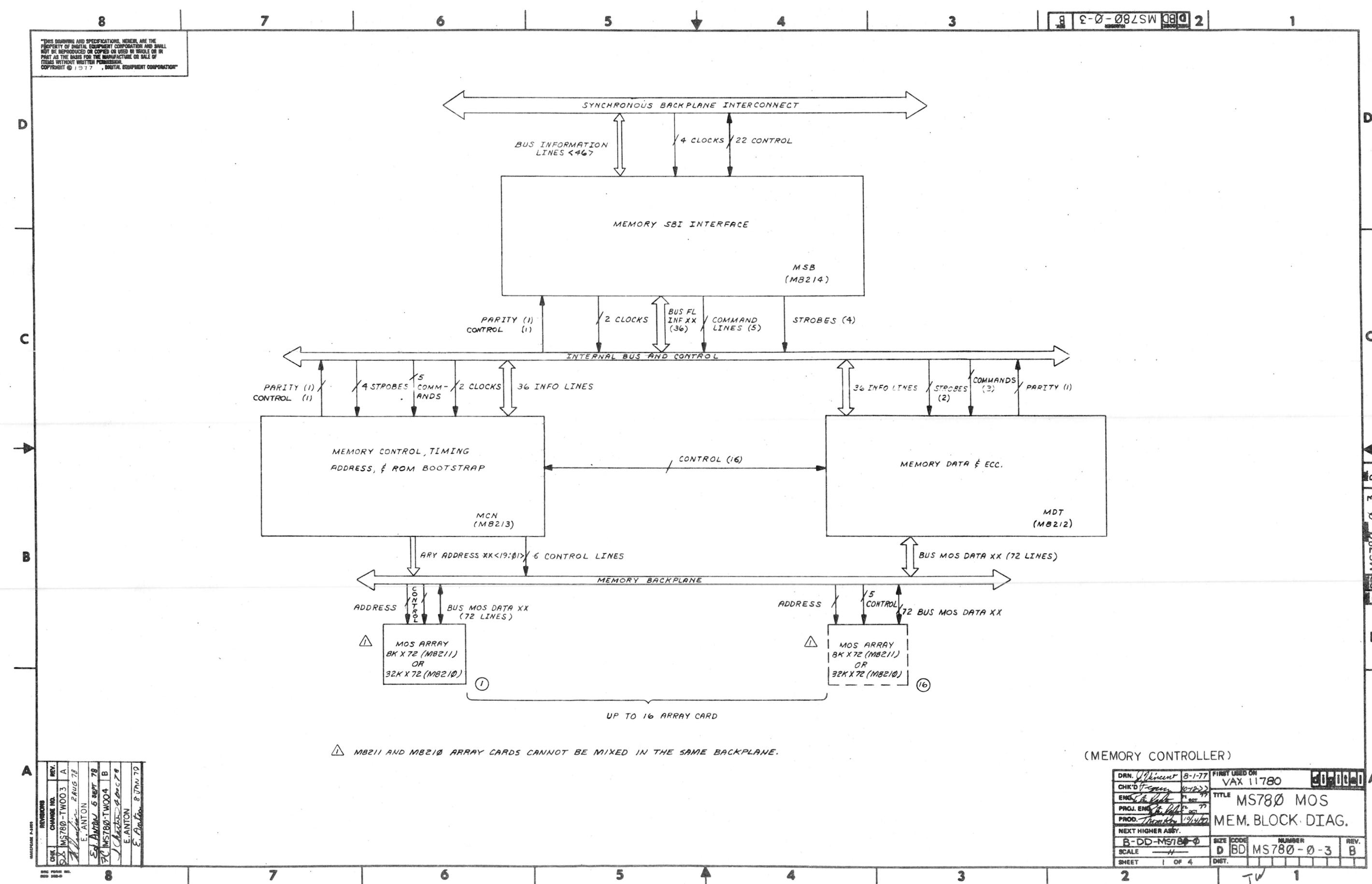
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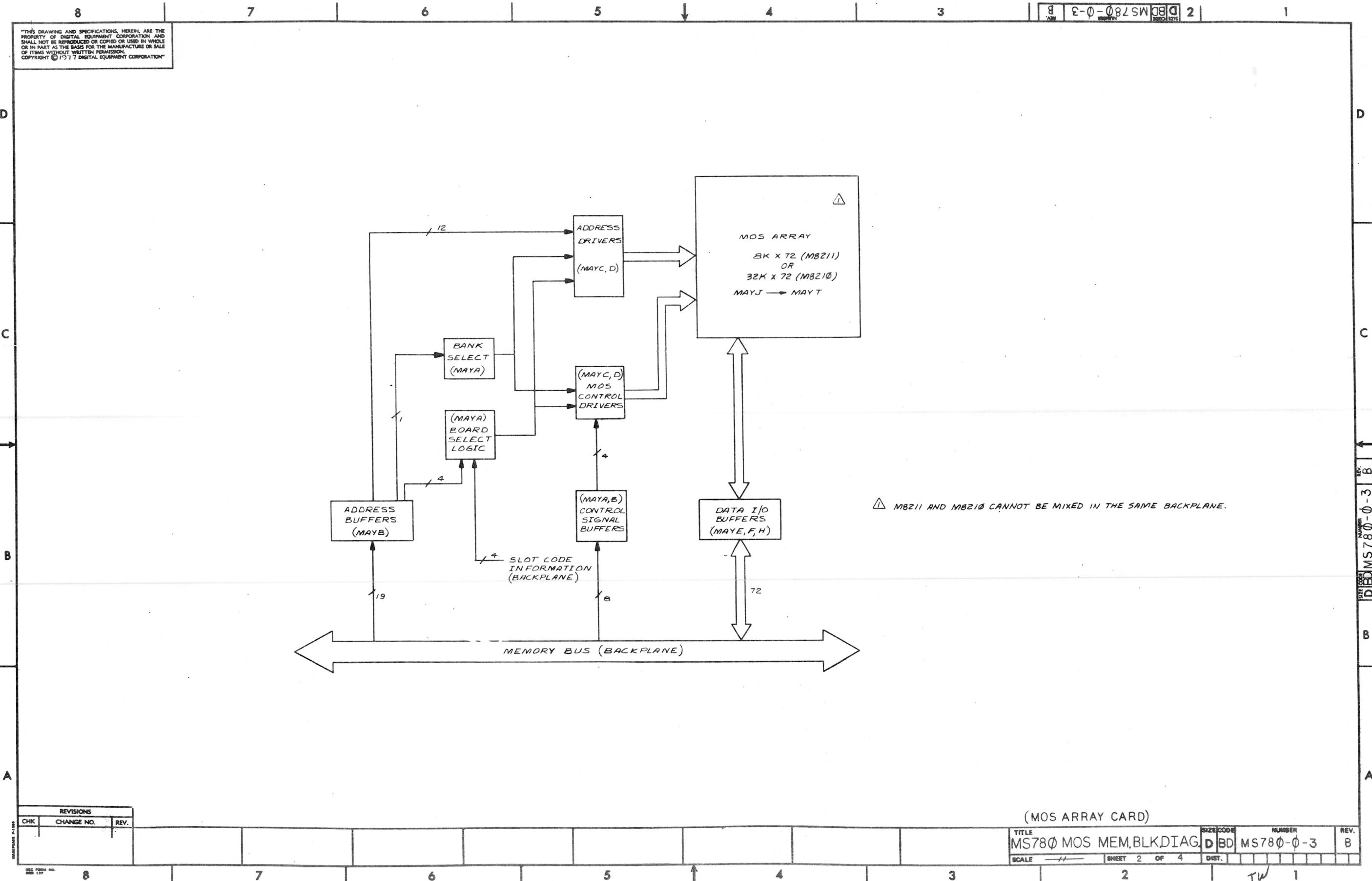
3

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TW 1





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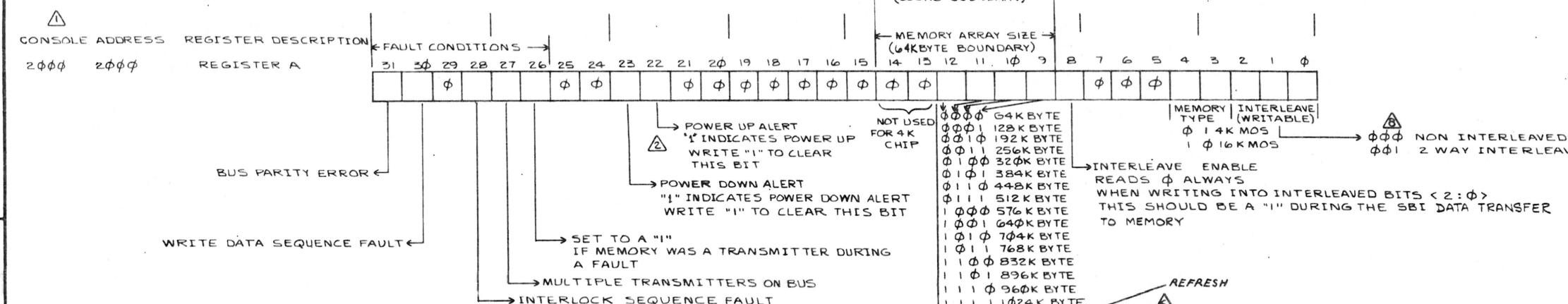


TABLE A 16K CHIP							
14	13	12	11	10	9	MEMORY ARRAY SIZE	
0	0	0	0	-	-	256K BYTE	
0	0	0	1	-	-	512K BYTE	
0	0	1	0	-	-	768K BYTE	
0	0	1	1	-	-	1024K BYTE	
0	1	0	0	-	-	1280K BYTE	
0	1	0	1	-	-	1536K BYTE	
0	1	1	0	-	-	1792K BYTE	
0	1	1	1	-	-	2048K BYTE	
1	0	0	0	-	-	2304K BYTE	
1	0	0	1	-	-	2560K BYTE	
1	0	1	0	-	-	2816K BYTE	
1	0	1	1	-	-	3072K BYTE	
1	1	0	0	-	-	3328K BYTE	
1	1	0	1	-	-	3584K BYTE	
1	1	1	0	-	-	3840K BYTE	
1	1	1	1	-	-	4096K BYTE	

2000 2004	REGISTER B																		
FILE READ COUNTER	FILE WRITE COUNTER	WHEN WRITING INTO BITS <27:15> BIT 14 SHOULD BE A "1" DURING SBI DATA TRANSFER INTO THE MEMORY 	ENABLE WRITE TO ← STARTING ADDRESS BITS <27:15> READS ALWAYS $\phi$	$\phi$	MEMORY INITIALISING \$ BATTERY BACKUP STATUS $\phi$ $\phi$ COLD START INZ IN PROGRESS     INZ COMPLETE $\phi$   VALID DATA   IN MEMORY   $\phi$ ILLEGAL STATE	WRITABLE ECC BITS FOR DIAGNOSTICS → ECC BYPASS BIT WRITE "1" TO BYPASS ECC WRITE " $\phi$ " TO CLEAR THIS BIT → FORCE ERROR AT A PREDEFINED ADDRESS WRITE "1" TO FORCE ERROR WRITE " $\phi$ " TO CLEAR THIS BIT													

 SINGLE CONTROLLER WITH TR LEVEL =

**2** THESE BITS ARE USED ONLY BY MEMORY  
CONTROLLERS WITHOUT ROM BOOTSTRAP

**⚠ STARTING ADDRESS IS ON 64K BYTE BOUNDARIES**

**A** THE ERROR SYNDROME BITS ARE INVALID UNLESS THE ERROR LOG SERVICE REQUEST BIT (BIT 28, REG C) IS SET TO A "1".

**⑤ REGISTER C, BITS <22:09> ARE 16K CHIP ADDRESS IN ERROR. BIT <23> IS THE ARRAY BANK IN ERROR (0 IS LOWER BANK & 1 IS THE UPPER BANK). THE MEANING FOR ALL OTHER BITS IN REGISTER C IS SAME FOR 4K & 16K CHIPS.**

- REFRESH INDICATOR FOR DIAGNOSTICS USE ONLY
- CAN BE IGNORED SINCE ARRAY IS QUADWORD ORGANIZED

**ORGANIZED.**

**△ STARTING ADDRESS SHOULD BE ON 64KB BOUNDARY FOR MB211(4K MOS) ARRAY AND 256KB FOR MB210 (16 KMOS). INTERLEAVING TWO MEMORY CONTROLLERS WITH DIFFERENT CHIP TYPES REQUIRE THAT THE CONTROLLER WITH MB210 (16MOS) ARRAYS SHOULD BE THE LOWER TR AND THE CONTROLLER WITH MB211 (4KMOS) ARRAYS BE THE HIGHER TR. BOTH CONTROLLER MUST HAVE EQUAL AMOUNTS OF STORAGE AND STARTING ADDRESS ON 256KB BOUNDARY.**

**REGISTER C**

2<sup>30</sup> 2<sup>29</sup> 2<sup>28</sup> 2<sup>27</sup> 2<sup>26</sup> 2<sup>25</sup> 2<sup>24</sup> 2<sup>23</sup> 2<sup>22</sup> 2<sup>21</sup> 2<sup>20</sup> 2<sup>19</sup> 2<sup>18</sup> 2<sup>17</sup> 2<sup>16</sup> 2<sup>15</sup> 2<sup>14</sup> 2<sup>13</sup> 2<sup>12</sup> 2<sup>11</sup> 2<sup>10</sup> 2<sup>9</sup> 2<sup>8</sup> 2<sup>7</sup> 2<sup>6</sup> 2<sup>5</sup> 2<sup>4</sup> 2<sup>3</sup> 2<sup>2</sup> 2<sup>1</sup> 2<sup>0</sup>

**MEMORY ADDRESS IN ERROR**

**INHIBIT CRD (CORRECTED READ DATA) TAGS**  
WRITE "1" TO INH CRD TAGS  
WRITE "0" TO CLEAR THIS BIT

**ARRAY BOARD IN ERROR**  
0<sup>0000</sup> BOARD 1      0<sup>0001</sup> BOARD 2  
0<sup>0010</sup>      0<sup>0011</sup>      3  
0<sup>0100</sup>      0<sup>0101</sup>      4  
0<sup>0110</sup>      0<sup>0111</sup>      5  
0<sup>1000</sup>      0<sup>1001</sup>      6  
0<sup>1010</sup>      0<sup>1011</sup>      7  
0<sup>1100</sup>      0<sup>1101</sup>      8  
0<sup>1110</sup>      0<sup>1111</sup>      9  
1<sup>0000</sup>      1<sup>0001</sup>      10  
1<sup>0010</sup>      1<sup>0011</sup>      11  
1<sup>0100</sup>      1<sup>0101</sup>      12  
1<sup>0110</sup>      1<sup>0111</sup>      13  
1<sup>1000</sup>      1<sup>1001</sup>      14  
1<sup>1010</sup>      1<sup>1011</sup>      15  
1<sup>1100</sup>      1<sup>1101</sup>      16  
**DON'T CARE FOR 4K CHIP**

**4 K CHIP ADDRESS IN ERROR (SEE NOTE 5 FOR 16K CHIP)**  
**MEMORY ADDRESS IN ERROR**

**ARRAY BANK IN ERROR**  
"0" LOWER BANK  
"1" UPPER BANK

**ERROR SYNDROME**  
POINTS TO BIT IN ERROR  
SEE SYNDROME TABLE ON PAGE 4.

**WORD IN ERROR**  
"0" LOWER WORD  
"1" UPPER WORD

**HIGH ERROR RATE IN MEMORY FLAG**  
"1" HIGH ERROR RATE INDICATION  
WRITE "1" TO CLEAR THE FLAG

REVISIONS		
CHG	CHANGE NO.	REV

(MEMORY CONTROLLER CONFIGURATION REGISTERS)

TITLE	MS780 MOS MEM. BLK. DIAG		SIZE CODE	NUMBER	RE
SCALE	1/4	SHEET	3 OF 4	DIST.	B

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ERROR SYNDROME (HEX)	LONG WORD	BIT IN ERROR
01	CHECK BYTE	C00
02		C01
04		C02
08		C03
10	CHECK BYTE	C04
19	LOWER	01
1A		02
1C		04
1F	LOWER	07
20	CHECK BYTE	C05
38	LOWER	08
3B		03
3D		05
3E	LOWER	06
40	CHECK BYTE	C06
49	LOWER	09
4A		10
4C		12
4F		15
51		17
52		18
54		20
57		23
58		24
5B		27
5D		29
5E		30
68		08
6B		11
6D		13
6E		14
70		16
73		19
75		21
76		22
79		25
7A		26
7C		28
7F	LOWER	31

ERROR SYNDROME (HEX)	LONG WORD	BIT IN ERROR
80	CHECK BYTE	C07
89	UPPER	01
8A		02
8C		04
8F		07
91		09
92		10
94		12
97		15
98		16
9B		19
9D		21
9E		22
A8		00
AB		03
AD		05
AE		06
B0		08
B3		11
B5		13
B6		14
B9		17
BA		18
BC		20
BF		23
C1		25
C2		26
C4		28
C7		31
E0		24
E3		27
E5		29
E6	UPPER	30

NOTE: 1. ALL ERROR SYNDROMES IN THIS TABLE HAVE AN ODD NUMBER OF BITS EQUAL TO A "1" AND ARE CORRECTABLE  
EXAMPLE: SYNDROME 38 = 00111000  
THIS SYNDROME HAS 3 "1"s

NOTE: 2. ERROR SYNDROMES WITH AN EVEN NUMBER OF BITS EQUAL TO "1" MEAN DOUBLE BIT ERROR  
DOUBLE BIT ERRORS ARE NOT CORRECTABLE

(MEMORY CONTROLLER SYNDROME TABLE)

REVISIONS	CHK	CHANGE NO.	REV.	8	7	6	5	4	3	2	1
MS780											
SIZE CODE	D	DBD	NUMBER	MS780-0-3	REV.						
SCALE	1/1	SHEET	4 OF 4	DET.							

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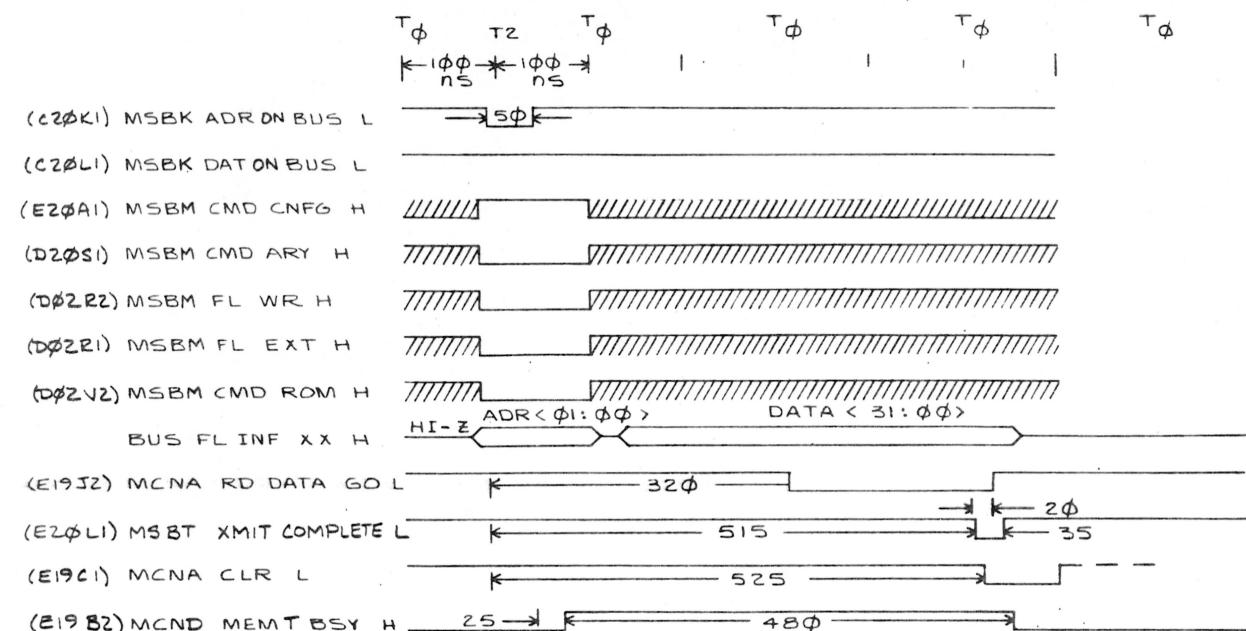
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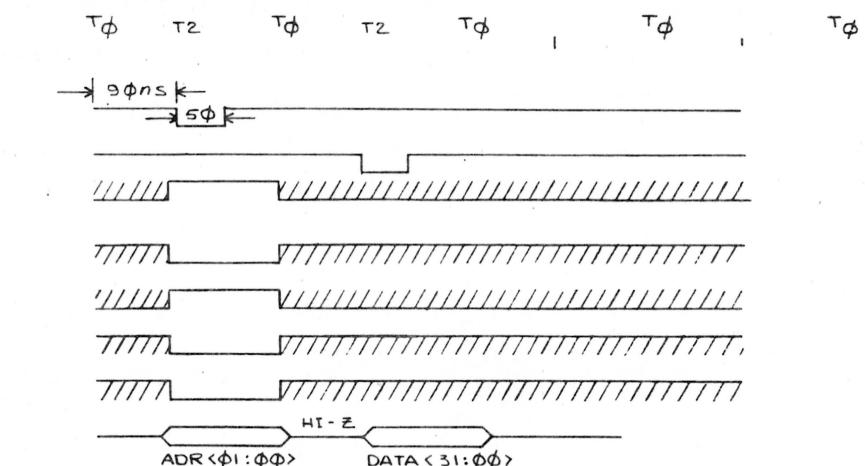
1

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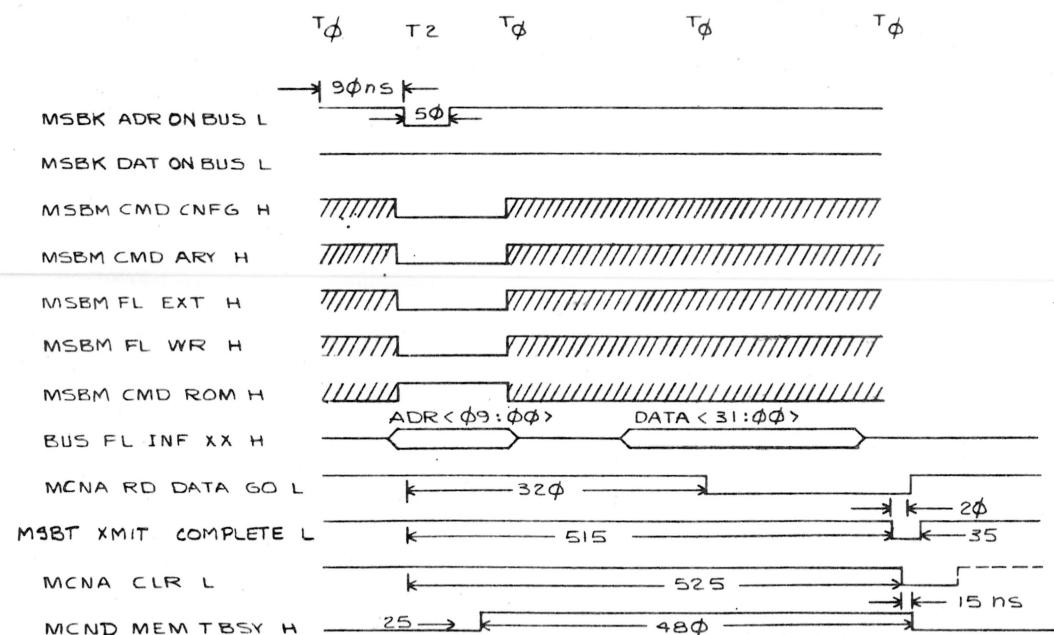
## READ CONFIGURATION REGISTER CYCLE



## WRITE CONFIGURATION REGISTER CYCLE



## READ ROM CYCLE



(MEMORY CONT. CONFIG, &amp; ROM CYCLES)

DRN. AEFM	3D-21	FIRST USED ON	VAX 11780	digitized
CHK'D	10/23/77			
ENG'D	PL-77	TITLE	MS780 MOS	
PROJ. ENG.	PL-77		MEM TIMING DIAG	
PROD. TEST	10/16/77			
NEXT HIGHER ASSY:				
B-DD-M5780-0				
SCALE		SHEET	1 OF 5	DIST.
			MS780-0-4	REV.

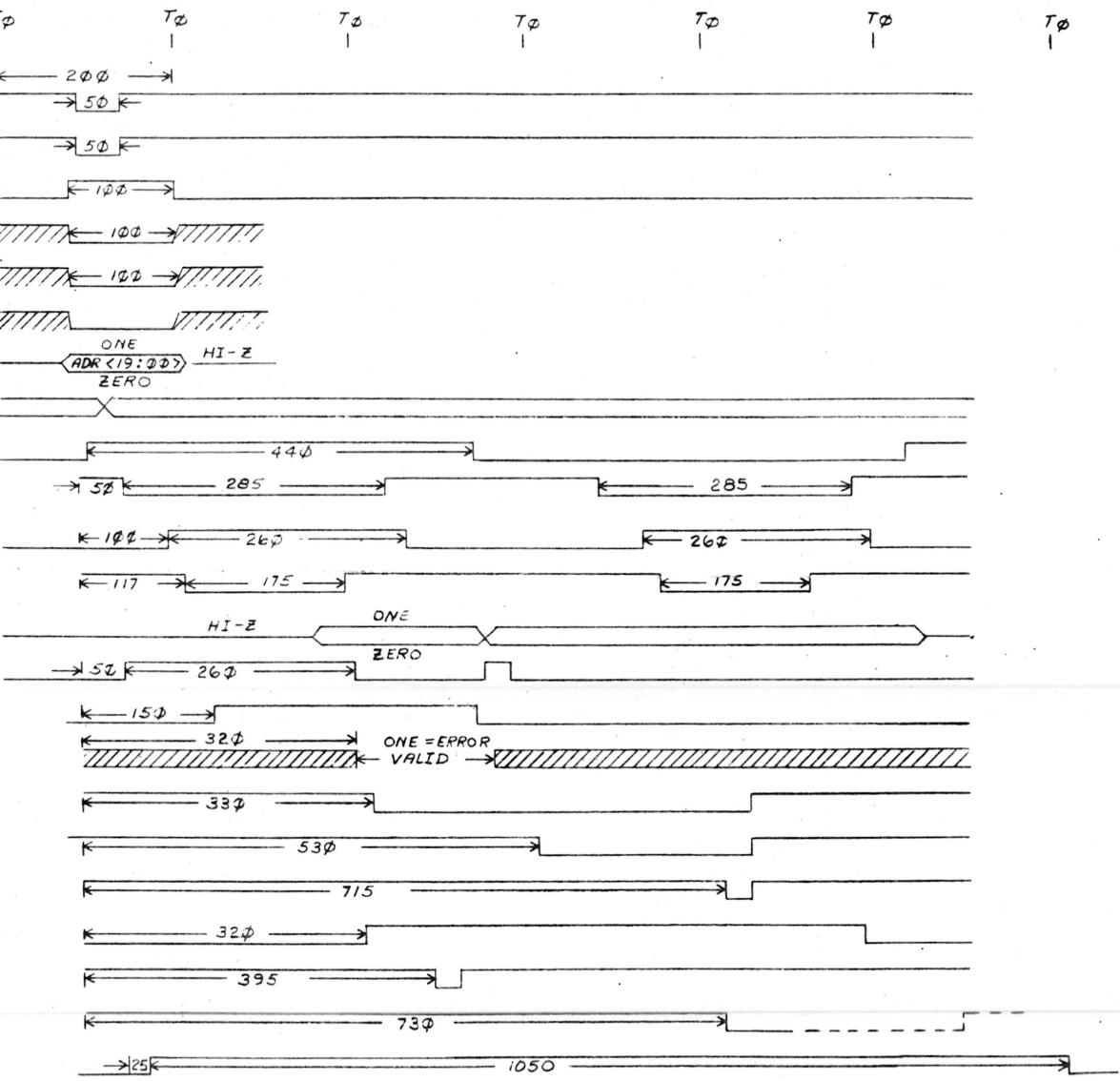
REVISIONS	
CHK /	CHANGE NO.
	REV.

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## ARRAY READ CYCLE WITHOUT ERROR



## ARRAY READ CYCLE WITH ERROR



D

D

C

C

B

B

A

A

REVISIONS		
CHK	CHANGE NO.	REV.

SHEET P-1144

REC FORM NO.

DHD 120

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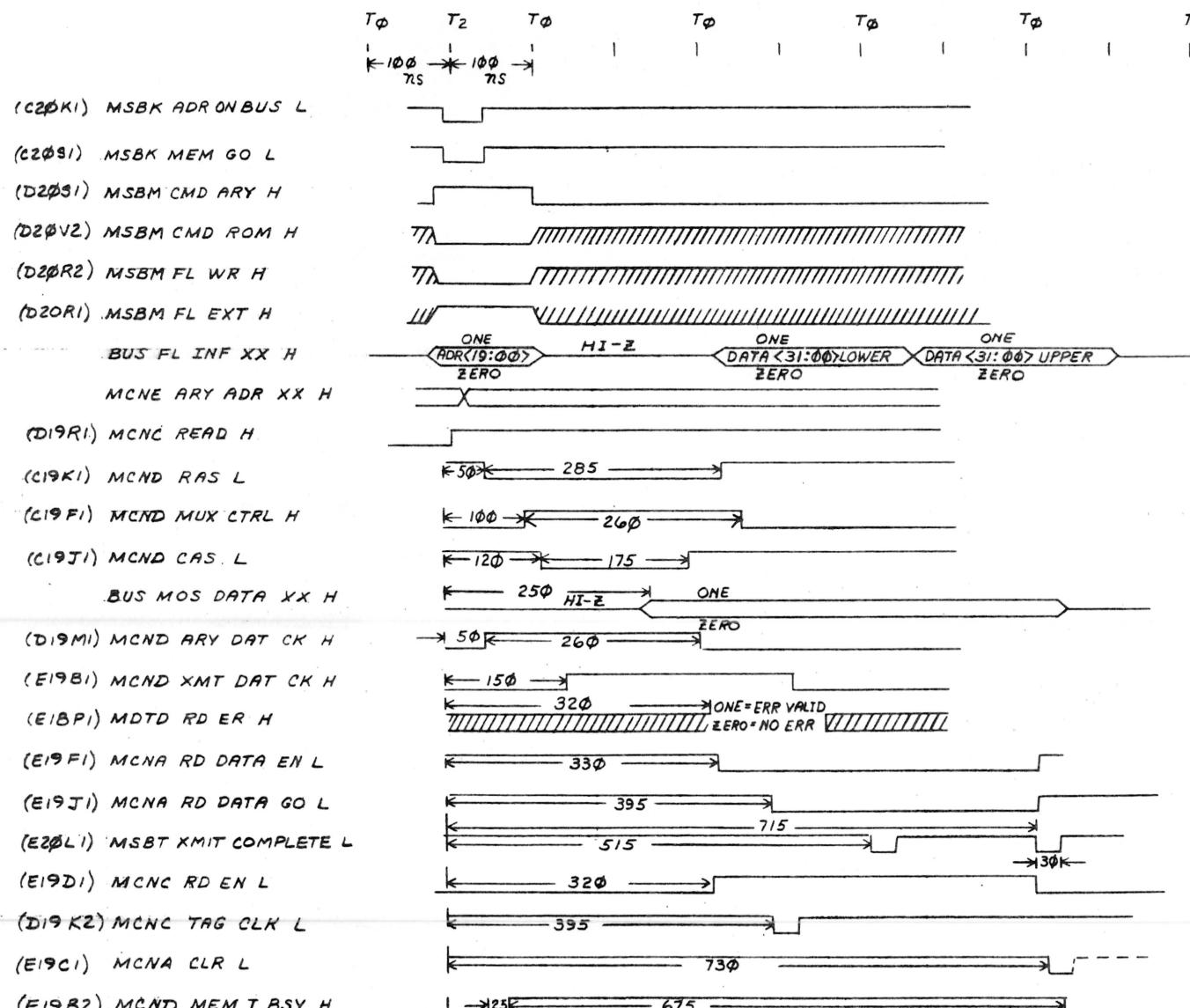
(MEMORY CONTROLLER ARRAY READ CYCLE)

TITLE: MS780 MOS MEM. TIM. DIAG.  
SIZE CODE: D TD  
NUMBER: MS780-Ø-4  
REV.

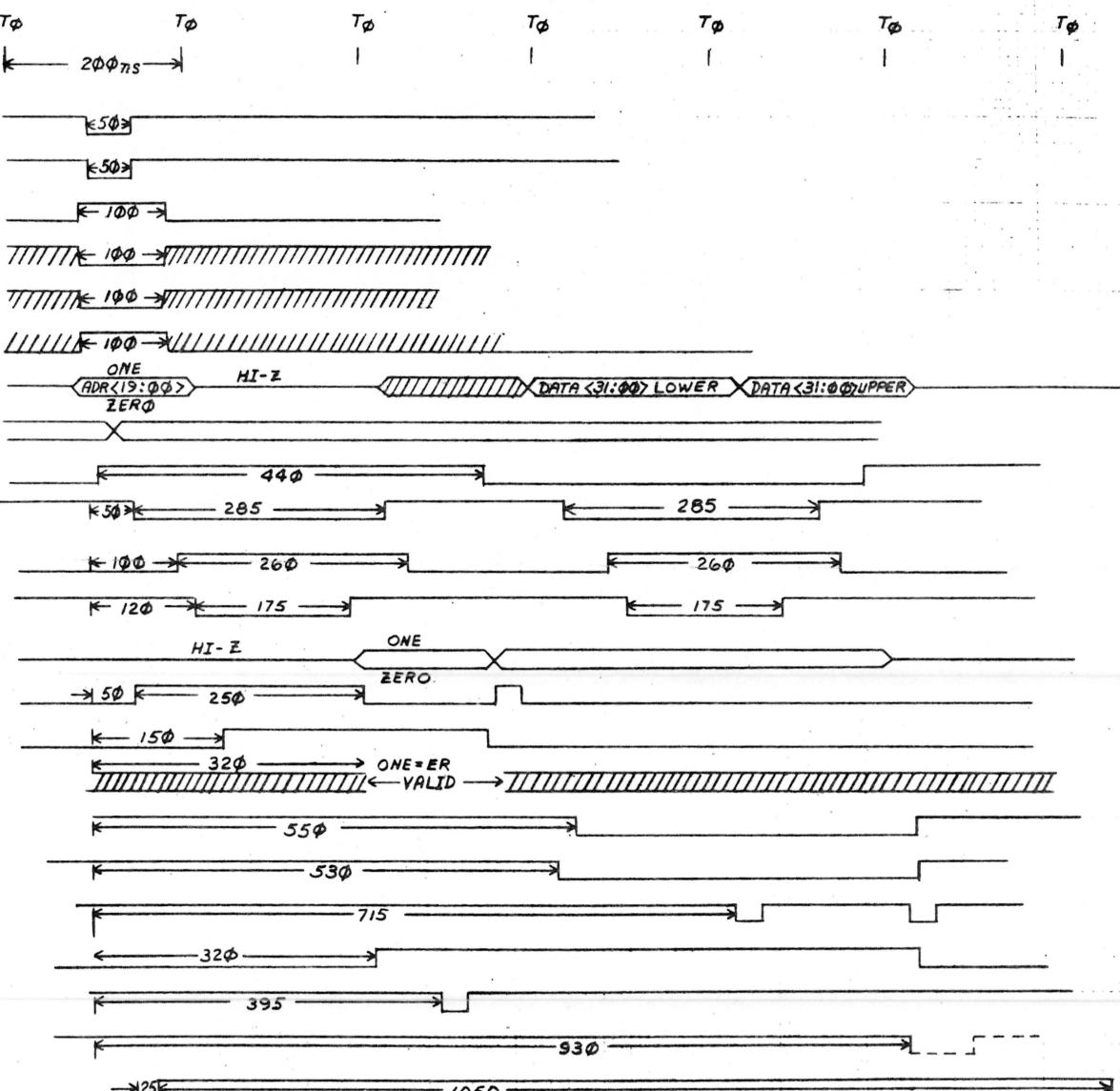
SCALE: // SHEET 2 OF 5 DIST.

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ARRAY READ EXTENDED CYCLE WITHOUT ERROR



ARRAY READ EXTENDED CYCLE WITH ERROR



(MEMORY CONTROLLER ARRAY READ EXTENDED CYCLE)

REVISIONS		
CHK	CHANGE NO.	REV.

TITLE		SIZE/CODE	NUMBER
MS780 MOS MEM. TIM DIAG	D TD	MS780-0-4	REV.
SCALE	SHEET 3 OF 5	DIST.	

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TD MS780-Ø-4

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D



- (C2ØK1) MSBK ADR ON BUS L
- (C2ØL1) MSBK DAT ON BUS L
- (C2ØS1) MSBK MEM GO L
- (D2ØS1) MSBM CMD ARY H
- (D2ØV2) MSBM CMD ROM H
- (D2ØR2) MSBM FL WR H
- (D2ØR1) MSBM FL EXT H
- BUS FL MSK XX H
- BUS FL INF XX H
- MCNE ARY ADR XX H
- (D19R1) MCNC READ H
- (C19K1) MCND RAS L
- (C19F1) MCND MUX CTRL L
- (C19J1) MCND CAS L
- BUS MOS DATA XX H
- (D19M1) MCND ARY DAT CK H
- (E19B1) MCND XMT DAT CK H
- (E18P1) MDTD RD ER H
- (E19D1) MCNC RD EN H
- (E19D2) MCND MEM T BSY H

C

B

(ARRAY WRITE MASKED CYCLE)

REVISIONS		
CHK	CHANGE NO.	REV.

BLK P14

80-116

40-116

TITLE MS780 MOS MEM. TIM.DIAG. SIZE CODE D TD NUMBER MS780-Ø-4 REV.

SCALE 1/1 SHEET 4 OF 5 DIST.

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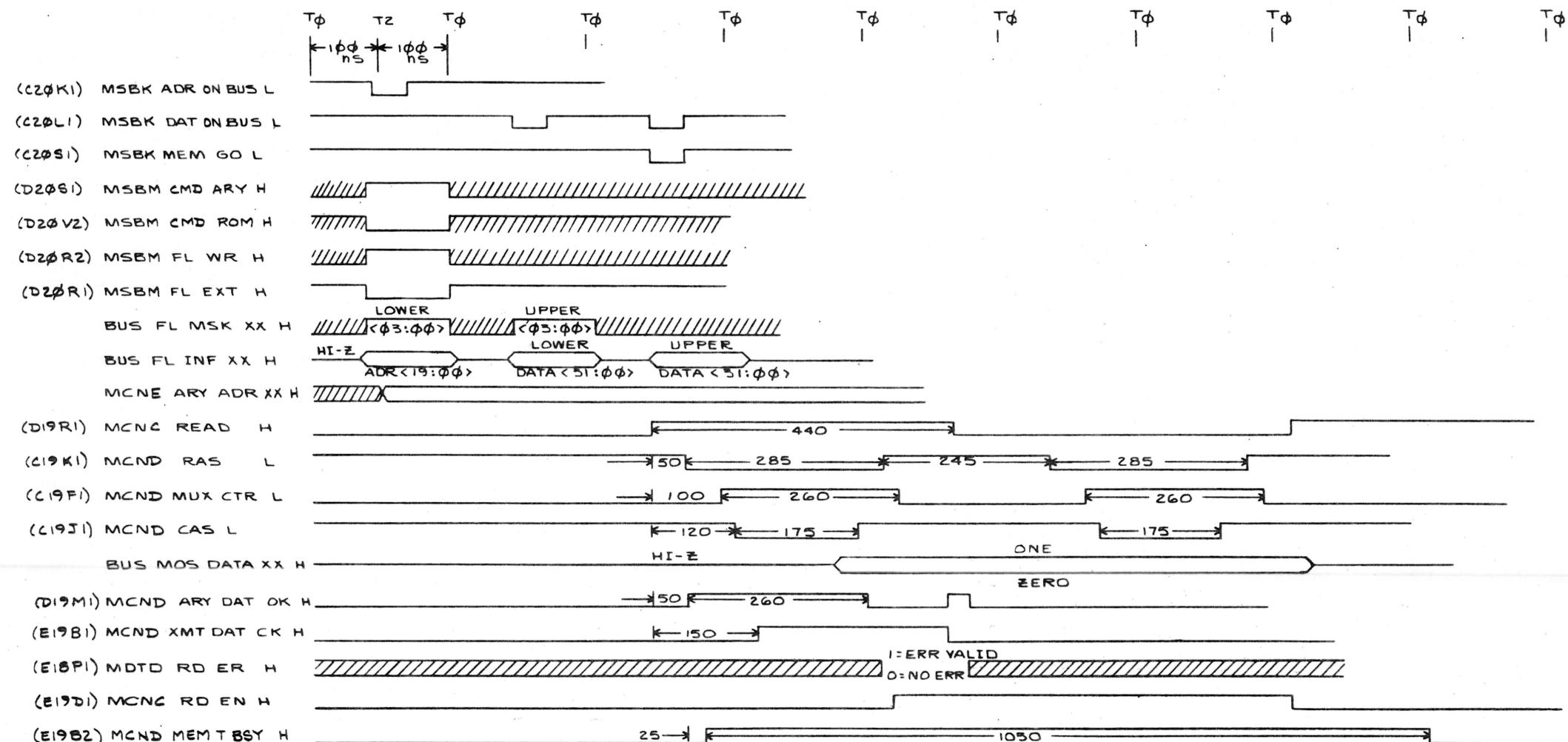
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2

1

8 7 6 5 4 3 2

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REVISIONS		
CHN	CHANGE NO.	REV.

SEA PERIOD NO. 800 1000

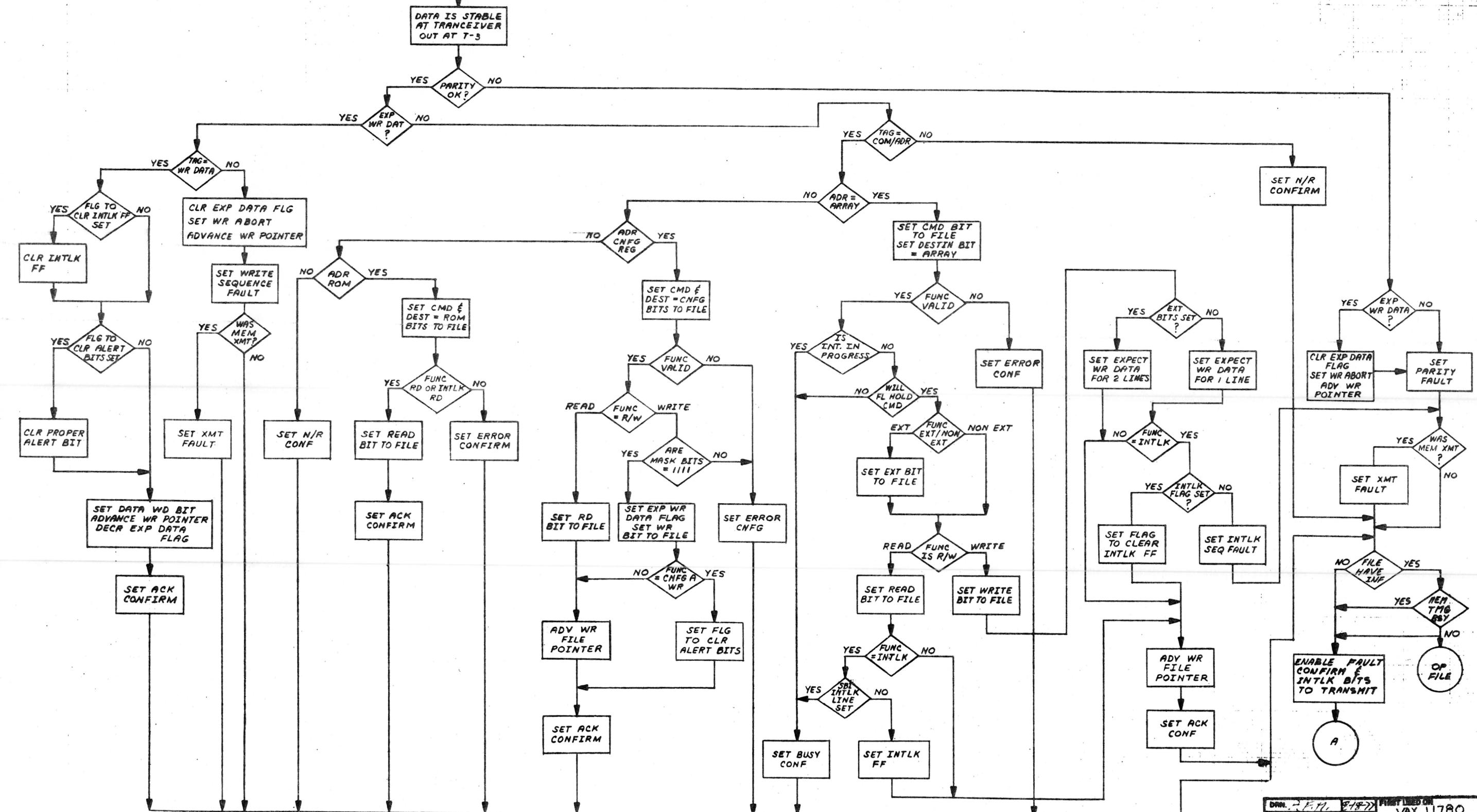
(ARRAY EXTENDED WRITE MASKED CYCLE)

TITLE MS780 MOS MEM BLK. DIAG. D TD MS780-0-4  
SIZE CODE NUMBER REV.

SCALE 1:4 SHEET 5 OF 51 DRAFT

8 7 6 5 4 3 2

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DRN. 2 F. 11, 3/18/77	FIRST LISTED ON VAX 11780
CHK'D	10-12-77
ENG'D	10-12-77
PROJ. ENG'D	10-12-77
PROD. TEST'D	10-14-77
NEXT HIGHER ASSY.	
B-3D-MS780-0	
SCALE	1:1
SHEET	1 OF 2
SIZE CODE	NUMBER
D FD	MS780-0-5

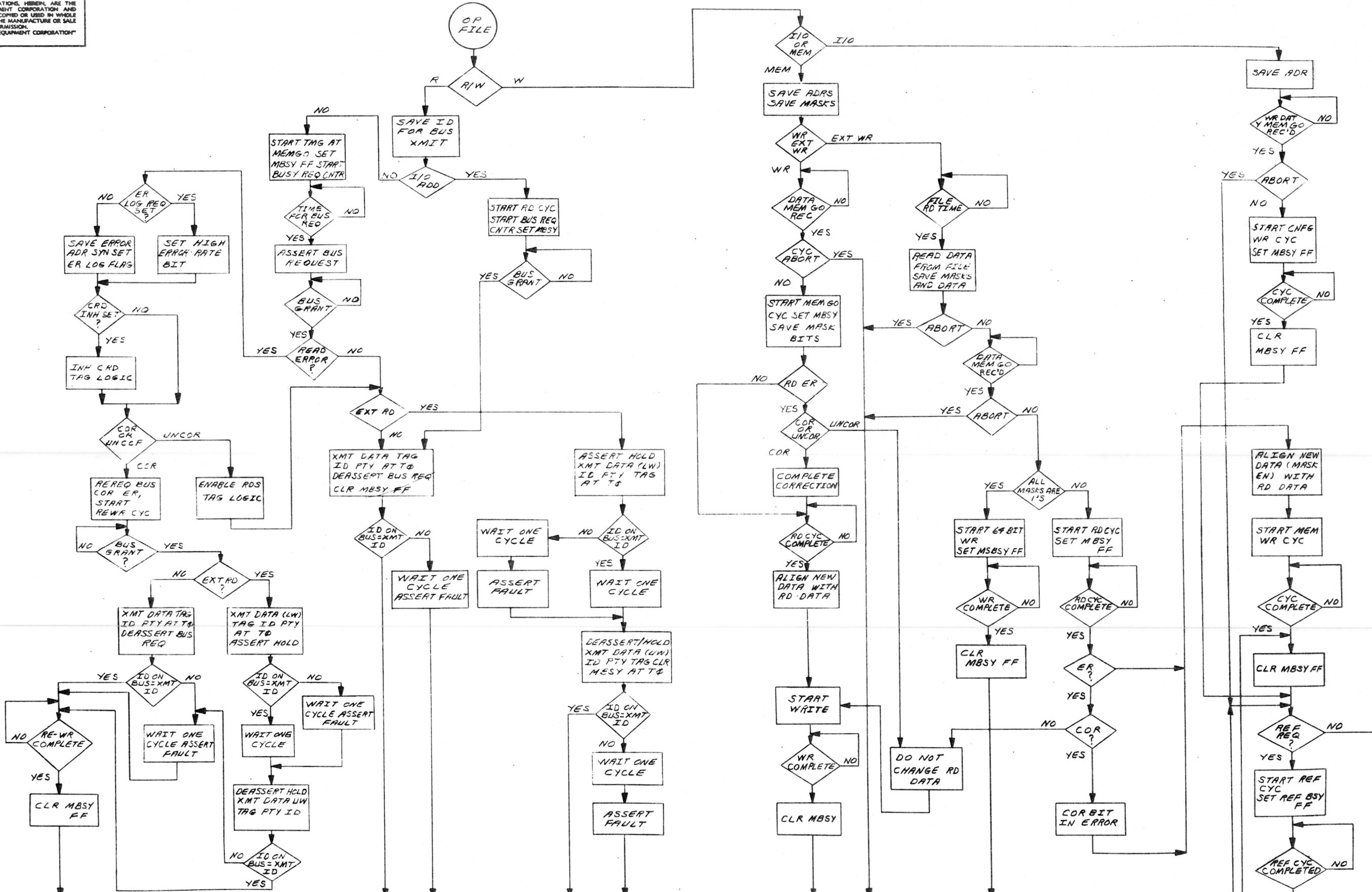
REV. 1

MS780 MQS MEM FLOW DIAG

REVISIONS		
CHK	CHANGE NO.	REV.

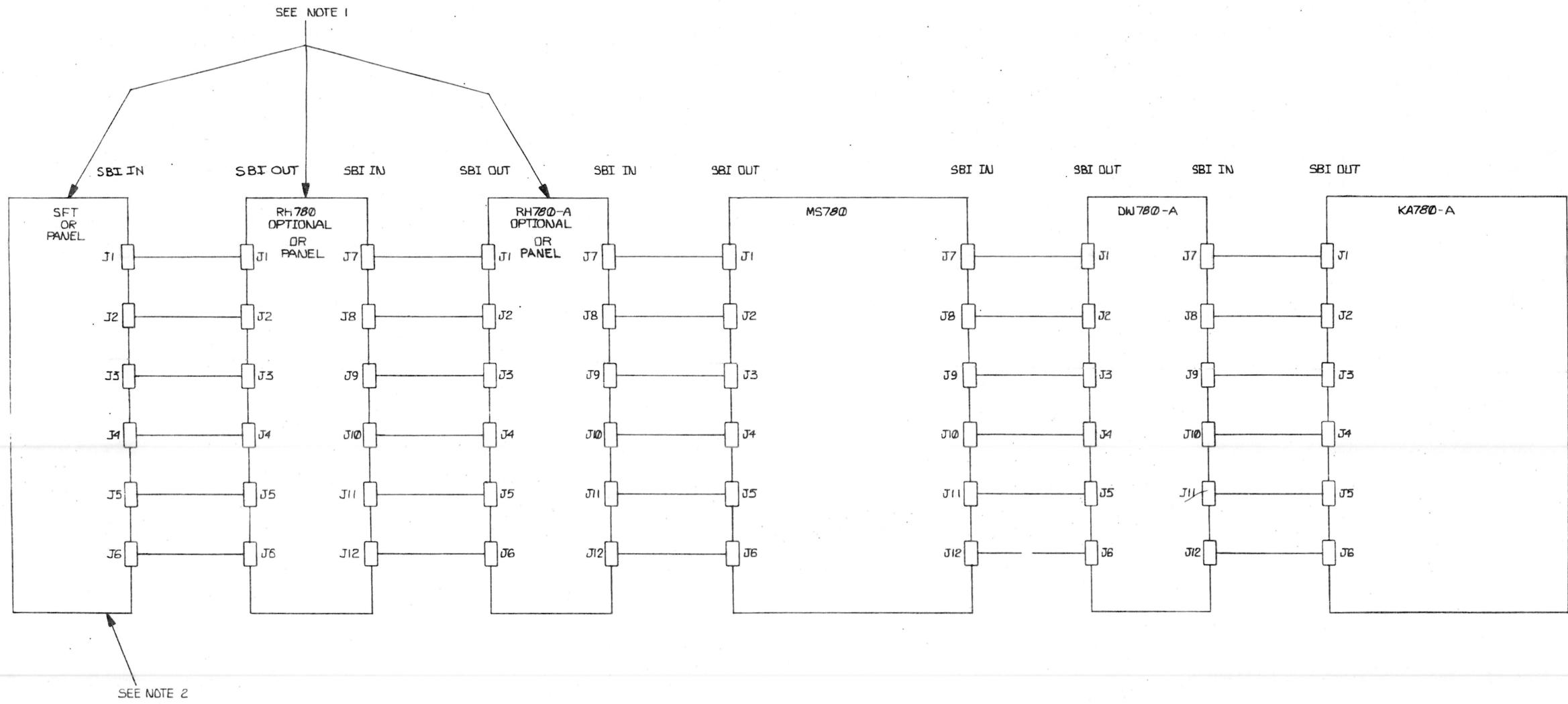
000 FORM NO. 000-100  
000 REV. 000

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REVISIONS		
CHK	CHANGE NO.	REV.
DEC FORM NO. 100-138		

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## NOTES:

1.) 11780-C SYSTEM CONSISTS OF  
A. KA780-A  
B. DW780-A  
C. MS780  
D. SFT (# M9043)  
E. 2 DUMMY PANELS (# 741897)

11780-D SYSTEM CONSISTS OF  
A. KA780-A  
B. DW780-A  
C. MS780  
D. RH780-A  
E. RH780  
F. SFT

2.) SBI CABLE CONNECTIONS TO  
SFT FROM ADJACENT BACKPLANE  
ARE ALWAYS 1700087-1. (QUANTITY 6)  
OTHER SBI CABLES ARE 1700087-0

2.) SBI CABLE CONNECTIONS TO  
SFT FROM ADJACENT BACKPLANE  
ARE ALWAYS 1700087-1 (QUANTITY 6)  
OTHER SBI CABLES ARE 1700087-0

## (BACKPLANE S.B.I. INTERCONNECT )

DRN. E. TAYLOR	26 JUL 77	FIRST USED ON 11780	digital
CHK'D D. <i>[Signature]</i>	19 AUG 77		
ENG Ed. Antire	Sept 77	TITLE	
PROJ. ENG. <i>[Signature]</i>	Sept 77	11780 SUB SYSTEM INTERCONN.	
PROD. R. <i>[Signature]</i>	11-6-77		
NEXT HIGHER ASSY.			
B-DD-11780-0	SIZE	CODE	NUMBER
SCALE	D	IC	11780-0-3
SHEET 1 OF 8	DIST.		REV. B

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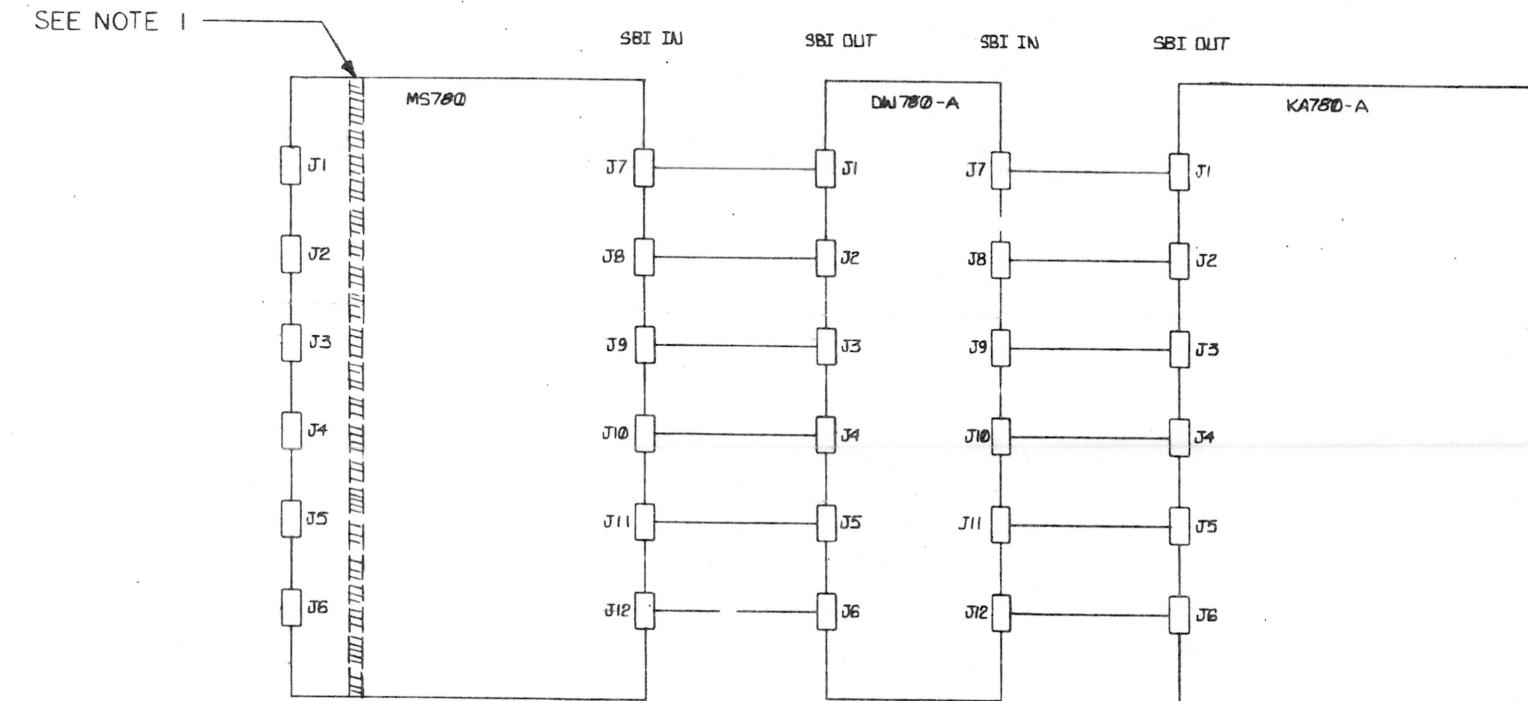
4

3

2

1

11780-0-3  
B  
D  
IC



NOTES:

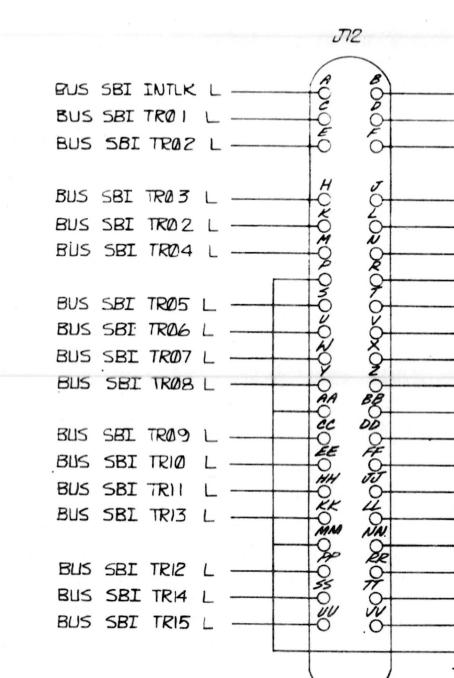
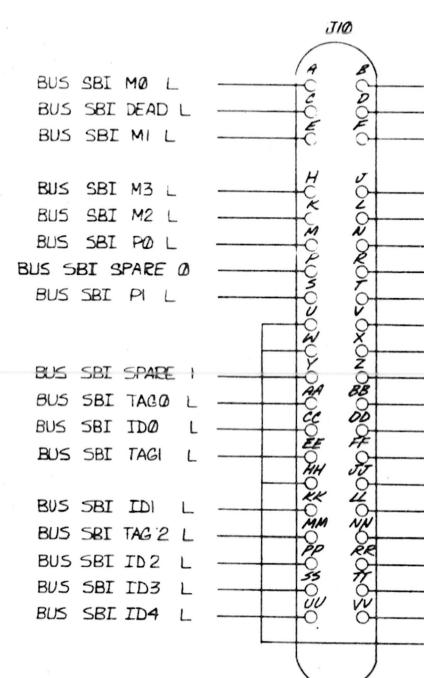
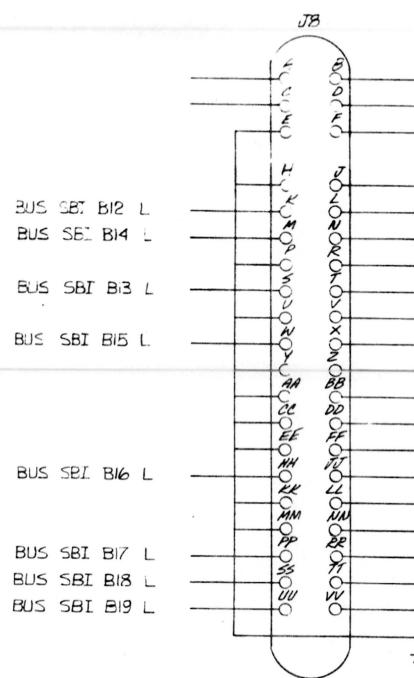
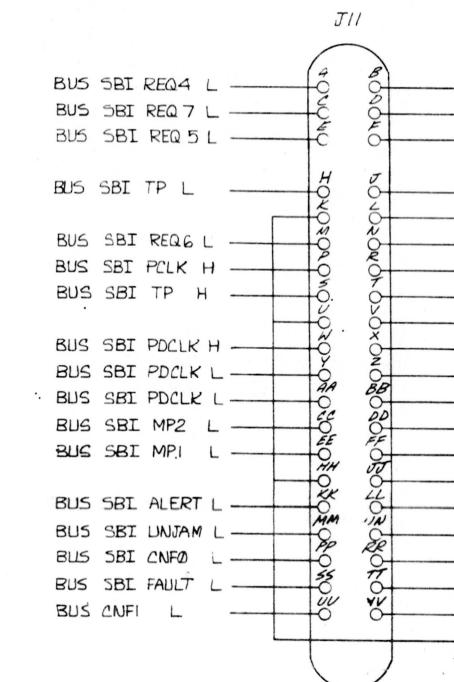
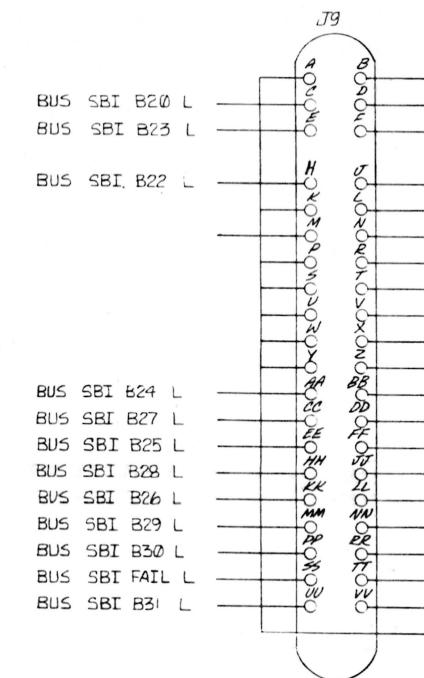
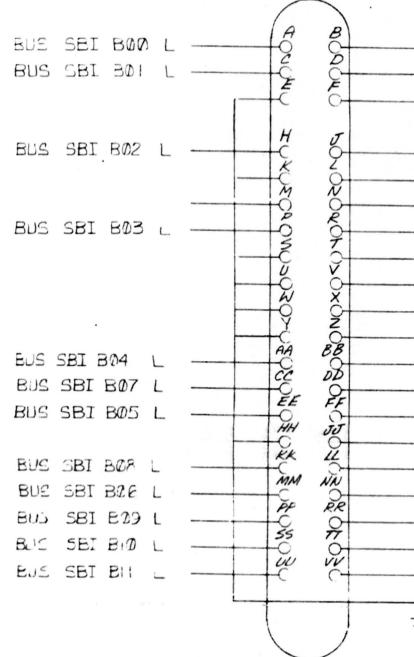
- 1) 11780 CU+CV SYSTEM CONSISTS OF
  - A. KA780 A
  - B. DW780 A
  - C. MS780
  - D. TRM (M9040) MOUNTED IN SLOT\* 1 OF MS780 BACKPLANE.

THIS SHEET FOR  
CU+CV VARIATIONS  
ONLY

A  
REVISIONS  
CHANGE NO.  
REV.  
CHN

DRN. Reg Lennon	9/17/79	FIRST USED ON	11780	digital
CHK'D		TITLE	11780 SUB SYSTEM INTERCONN.	
ENG.				
PROJ. ENG				
PROD.				
NEXT HIGHER ASSY.				
D-DD-11780-0				
SCALE	<i>✓</i>	SIZE	CODE	NUMBER
		D	IC	11780-0-3
SHEET	2	OF	8	REV.
DIST.				B

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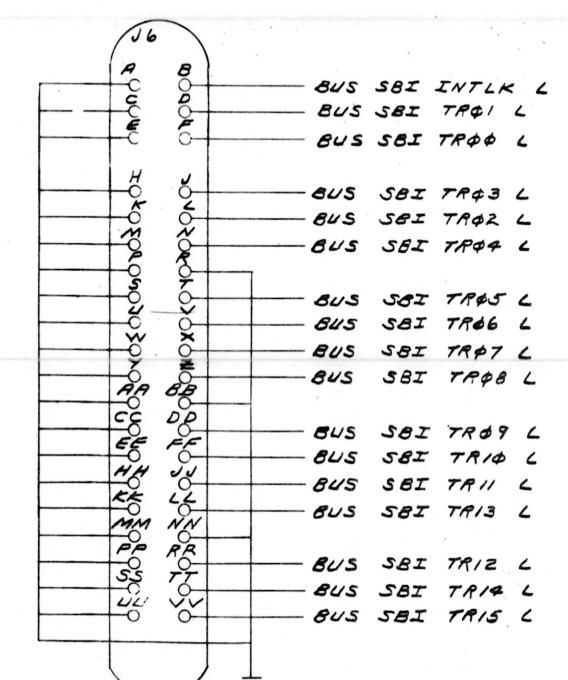
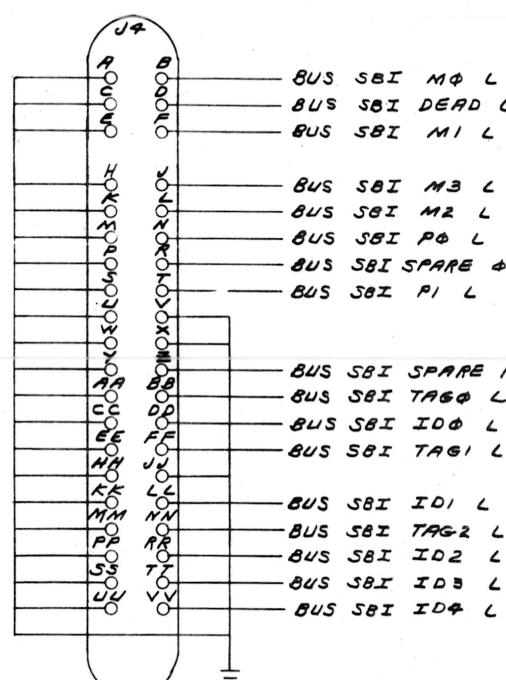
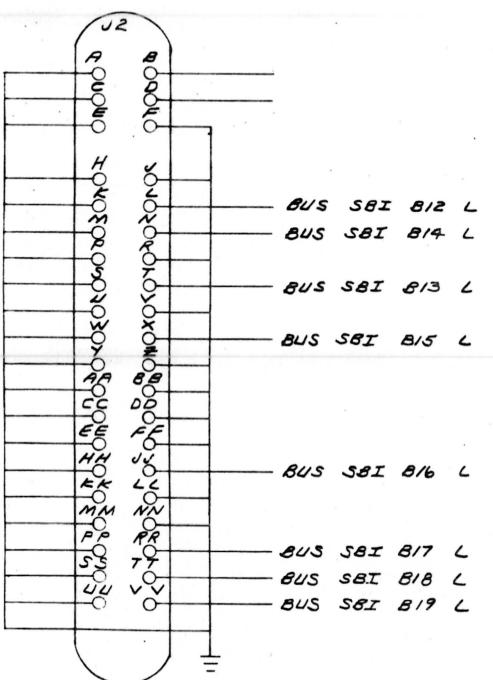
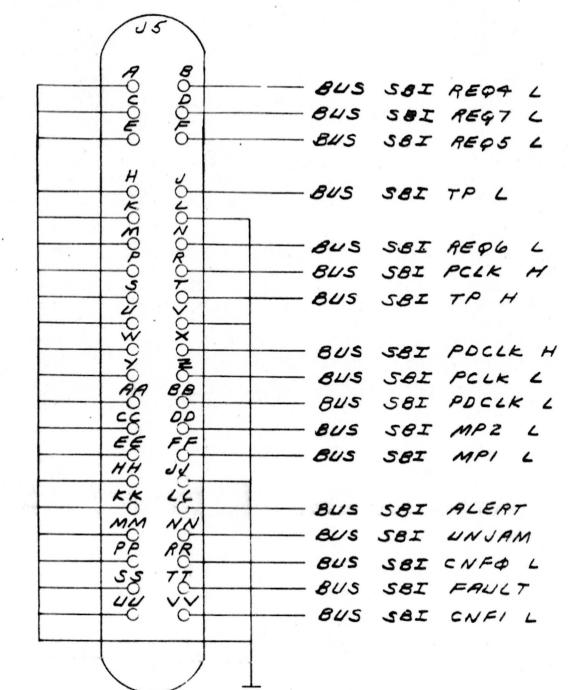
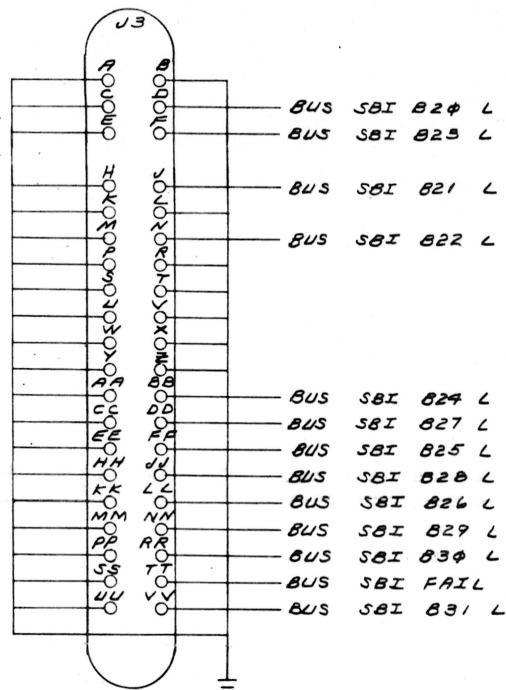
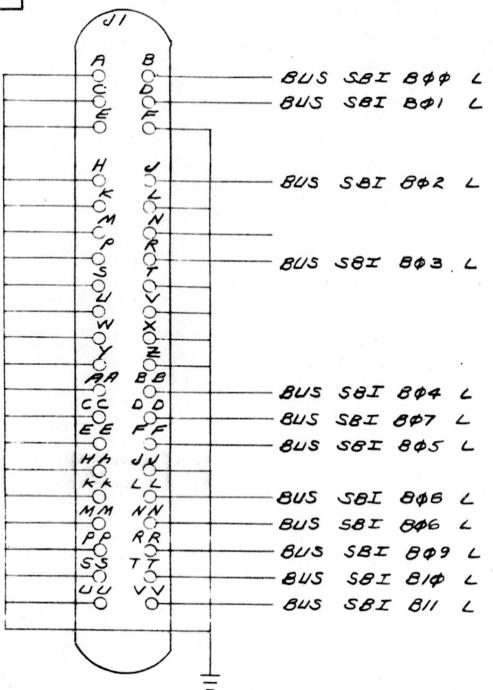
MADE FOR D.E.C.  
REVISIONS  
CHG. NO.  
REV.

DEC FORM NO.  
D-102-0

DRN. E Taylor	25 JUL	FIRST USED ON	11780	Digital
CHK'D. D. Tracy	16 AUG	CODE		
ENG. Ed Antler	Sept 22	TITLE	11780 SUB SYSTEM	
PROJ. ENG. W. Miller	16 Sept 77	INTERCONNECT		
PROD. R. Ziegler	11-18-77			
NEXT HIGHER ASSY.				
B-DD-11780				
SCALE	11	SIZE	CODE	NUMBER
D	IC	11780	-0-3	REV.
SHEET 3 OF 8				DIST. B

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8 7 6 5 4 3 2 1  
D D C C B B A A  
D I C 11780-0-3  
D I C 11780-0-3



REVISIONS  
CHANGE NO.  
CHK  
NAME/PCB P-1055

(S.B.I. OUT)

DRN. ET ALOR	29 JUL 77	FIRST USED ON	11780	digital
CHK'D	10 AUG 77	16 AUG 77		
ENG.	Ed Antoh	Ed Antoh		
PROJ. ENG.	11780	11780		
PROD. R.	11-10-77	11-10-77		
NEXT HIGHER ASSY.				
SCALE	+	+	SIZE	CODE
D	I	C	11780	NUMBER 0-3
SHEET	4	OF	8	REV. B
DIST.				



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## NOTES:

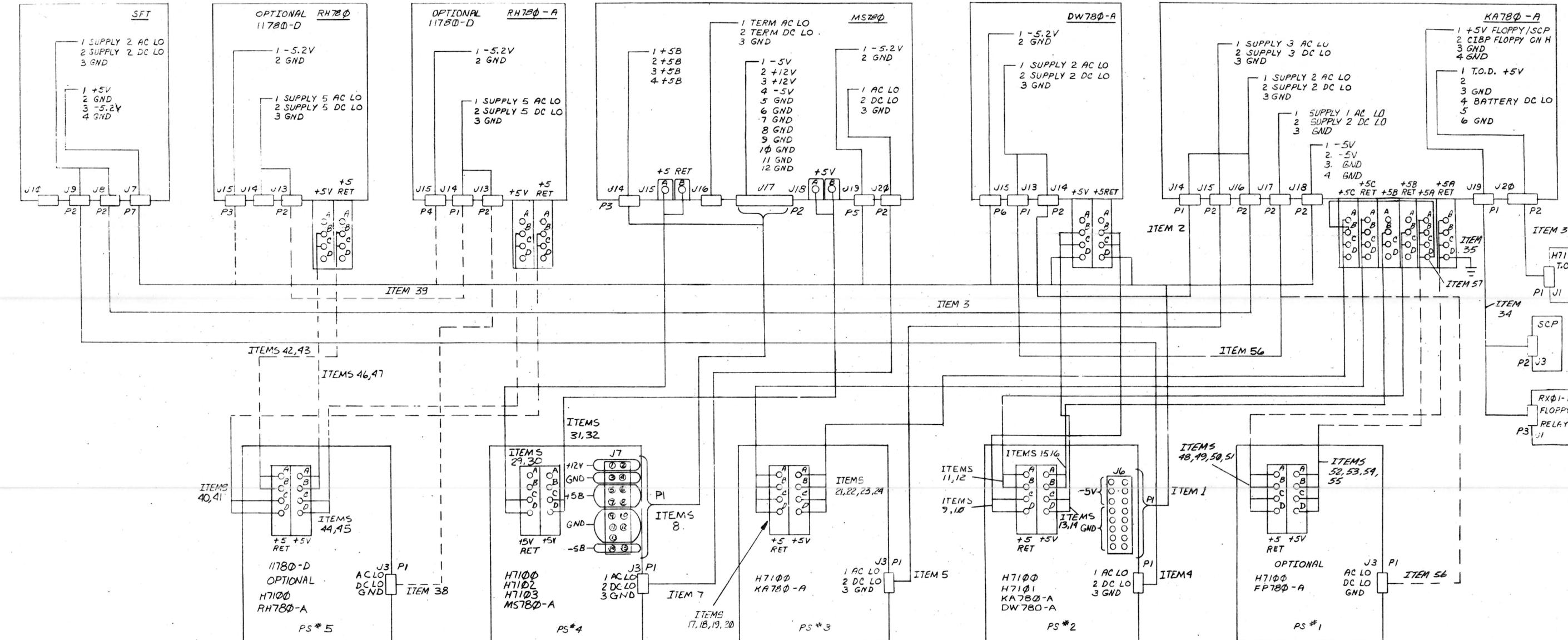
1.) ITEM # 5 ARE SHOWN FOR REFERENCE  
IN LOCATING CABLE DESTINATIONS ONLY  
USING SHEET 6 D-IC-11780-0-3

D

C

B

A



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## 11780 - C &amp; D (SEE SHEETS 7&amp;8 FOR CUCV VARIATIONS)

REF ITEM NUMBER	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7015073-0-0	HARNESS-5V TERMINATOR	HARNESS P1	PS#2-J6	-5V GND
			HARNESS P2	KA780-J18	
			HARNESS P5	MS780-J19	
			HARNESS P6	DW780-J15	-5V, GND
			HARNESS P7	SFT-J7	±5V, GND
		HARNESS RING TERM (RED WIRE)	DW780+5V-D	+5V	
	7015073-0-0	HARNESS-5V TERM	HARNESS RING TERM (BLACK WIRE)	DW780+5VRT-D	+5V RETURN
2	7014212-0H	CABLE AC DC LOW	CABLE P1	KA780-J14	
			CABLE P2	DW780-J14	
3	7014212-2M	CABLE AC DC LOW	CABLE P1	KA780-J16	
			CABLE P2	SFT-J8	
4	7014212-2M	CABLE AC DC LOW	CABLE P1	PS#2-J3	AC DC LOW GND
			P2	SFT-J9	
5	7014212-0M	CABLE AC DC LOW	CABLE P1	PS#3-J3	AC DC LOW & GND
			P2	KA780-J15	
7	7014212-1C	CABLE AC DC LOW	CABLE P1	PS#4-J3	AC DC LOW & GND
			P2	MS780-J20	
8	7014234-0K	CABLE ±5V & +12	CABLE P1	PS#4-J7	+5V & +12
			P2	MS780-J17	
			P3	MS780-J14	
9	7014243-1A	CABLE POWER(BLK)	PS#2+5 RET-D	DW780+5 RET-B	PS#2+5 RETURN
10	7014249-1A	CABLE POWER(BLK)	PS#2+5 RET-C	DW780+5 RET-C	
11	7014249-1C	CABLE POWER(BLK)	PS#2+5 RET-B	KA780+5B RET-B	
12	7014249-1C	CABLE POWER BLK	PS#2+5 RET A	KA780+5B RET C	PS#2+5 RETURN
13	7014530-1A	CABLE POWER(RED)	PS#2+5 -D	DW780+5 -B	PS#2+5
14			C	DW780+5 -C	
5	7014530-1A	CABLE POWER(RED)	PS#2+5 B	KA780+5B C	
16	7014530-1A	CABLE POWER(RED)	PS#2+5 A	KA780+5B B	PS#2+5
17	7014249-1T	CABLE POWER(BLK)	PS#3+5 RET D	KA780+5C RET D	PS#3+5 RETURN
18			C	C	
19			B	B	
20	7014249-1J	CABLE POWER(BLK)	PS#3+5 RET A	KA780+5C -A	PS#3+5 RETURN
21	7014530-1E	CABLE POWER(RED)	PS#3+5 -D	KA780+5C -D	PS#3+5 RETURN
22			C	C	
23			B	B	
24	7014530-1E	CABLE POWER(RED)	PS#3+5 -A	KA780+5C -A	
29	7014250-0K	CABLE POWER	PS#4+5 RET C	MS780-J15-A	PS#4+5 RETURN
30	7014250-0K	RTR MEMORY BLK	PS#4+5 RET D	MS780-J15 B	
31	7014529-0K	CABLE POWER	PS#4+5 C	MS780-J18-A	PS#4+5V
32		+5 MEMORY (RED)	PS#4+5 D	MS780-J18 B	
33	7014248-3M	CABLE TOT.O/D BAT.	HARNESS P2	KA780-J20	
			P1	H7111-J71	
34	7014243-2I	FLOPPY RELAY	HARNESS P1	KA780-J19	
		SC PWR HARNESS	P2	SCP-J3	
			P3	RX01-J1	
35	7014249-0L	CABLE POWER(BLK)	KA780-A+5A RET D	FRAME	
56	7014212-0M	CABLE AC/DC LO	CABLE P1	DW780-J13	SEE NOTE #3
			CABLE P2	KA780-J17	

REVISIONS	
CHG.	CHANGE NO.
	REV.

REF ITEM NUMBER	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7015073-0-0	HARNESS-5V TERM.	HARNESS P3	RH780-J15	-5V GND
1	7015073-0-0	HARNESS-5V TERM.	HARNESS P4	RH780-A-J15	-5V GND
38	7014212-0M	CABLE AC DC LOW	CABLE P1	PS#5-J3	AC DC LO & GND
39	7014212-0H	CABLE AC DC LOW	CABLE P2	RH780-J13	AC DC LO & GND
40	7014249-0L	CABLE POWER(BLK)	PS#5+5 RET-D	RH780-A+5 RETC	PS#5+5 RETURN
41			C	B	
42	7014249-0L	CABLE POWER(BLK)	PS#5+5 RET-B	RH780-A+5-C	PS#5+5 RETURN
43			A	B	
44	7014530-0L	CABLE POWER(RED)	PS#5+5 -D	RH780-A+5-C	PS#5+5V
45			C	B	
46	7014530-0L	CABLE POWER(RED)	PS#5+5 -B	RH780+5-C	PS#5+5V
47			A	B	

## 11780 - D

FP780  
OR  
FP780 & KU780

SEE NOTE 1

48	7014249-0L	POWER CABLE BLK	PS#1+5 A RET D	KA780+5A RET D	PS#1+5 RETURN
49			C	C	
50			B	B	
51	7014249-0L	POWER CABLE(BLK)	PS#1+5A RET A	KA780+5A RET A	PS#1+5 RETURN
52	7014530-0L	POWER CABLE(RED)	PS#1+5 -D	KA780+5A -D	PS#1+5V
53			C	C	
54			B	B	
55	7014530-0L	POWER CABLE(RED)	PS#1+5 -A	KA780+5A -A	PS#1+5V
56	7014212-0M	CABLE AC DC LO	CABLE P1	PS#1 J3	AC DC LOW
			P2	KA780-J17	

SEE NOTE 3

OPTIONAL  
KC780 OR KU780  
SEE NOTE 2

57	7014530-0L	CABLE POWER(RED)	KA780-A+5A D	KA780-A+5C-B	PS#2+5V
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## NOTES:

1. REFER TO E-UA-KA780 FOR INSTRUCTIONS OF JUMPER REMOVAL IN CONFIGURATIONS USING PS#1.
2. IF THE FP780 IS INSTALLED REMOVE ITEM 57.
3. IF THE FP780 IS INSTALLED; ITEM #56 PI CONNECTS TO PS#1-J3, OTHERWISE IT IS CONNECTED TO DW780-J13.

11780 SUB-SYSTEM INTERCONNECT

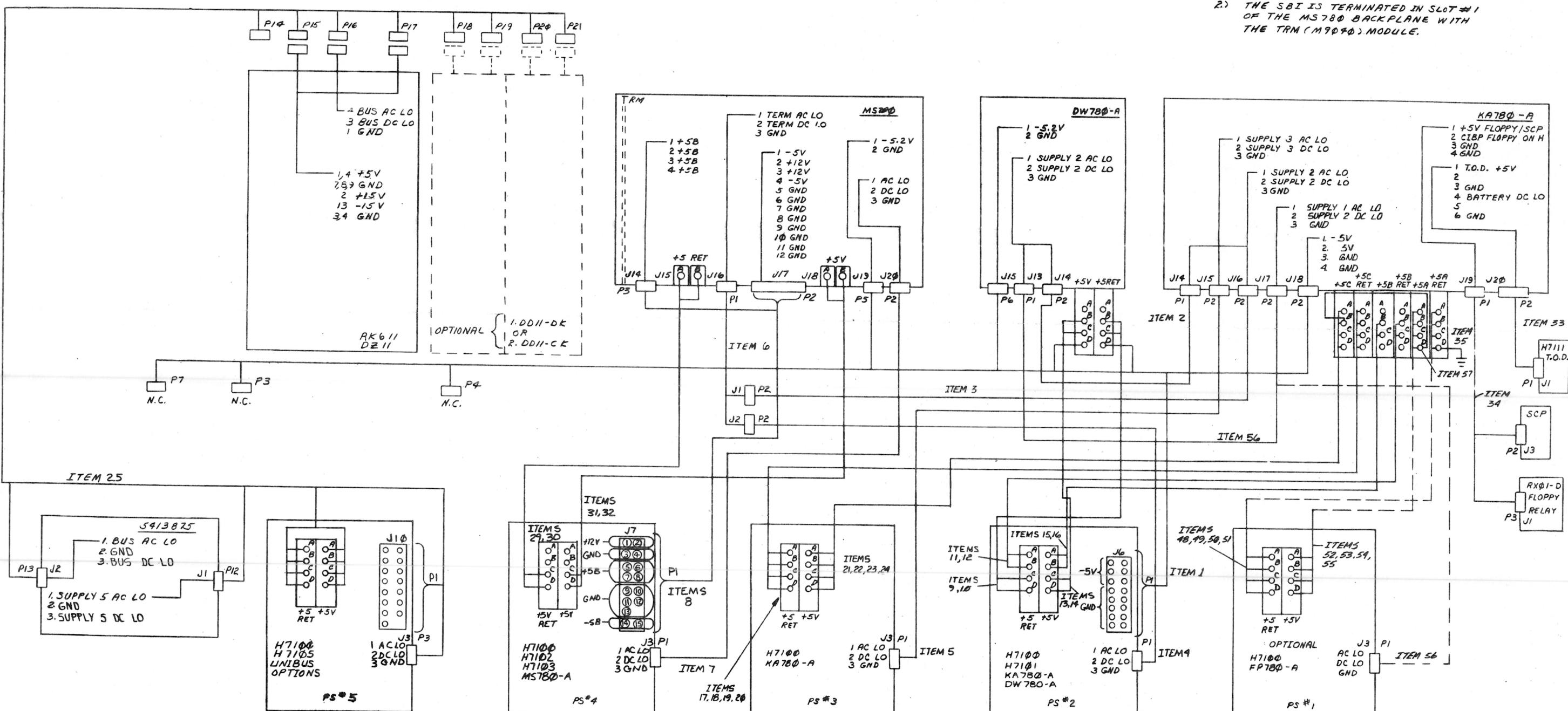
SIZE CODE	D 1C	NUMBER	11780-0-3
REV.	B		

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### NOTES:

1.) ITEM # S ARE SHOWN FOR REFERENCE  
IN LOCATING CABLE DESTINATIONS ONLY  
USING SHEET B D-1C-11780-0-3

2) THE SBI IS TERMINATED IN SLOT #1 OF THE MS780 BACKPLANE WITH THE TRM (M9040) MODULE.



THIS SHEET FOR  
CU & CV VARIATIONS  
ONLY

SEE SHEET #8 FOR REF. PARTS LIST.  
(BACKPLANE D.C. INTERCONNECT)

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## 11780-CU/CV

REF ITEM NUMBER	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7015073-0-0	HARNESS-5V TERMINATOR	HARNESS - P1	PS#2 - J6	-5V GND
			HARNESS - P2	KA780-J18	
			HARNESS - P5	MS780-J19	
			HARNESS - P6	DW780-J15	-5V GND
			HARNESS - P7	N.C.	±5V GND
			HARNESS RING TERM. (RED WIRE)	DW780+5V-D	+5V
	7015073-0-0	HARNESS-5V TERMINATOR	HARNESS RING TERM. (BLK WIRE)	DW780+5V RT-D	+5V RETURN
2	7014212-0H	CABLE AC DC LOW	CABLE - P1	KA780-J14	AC,DC LOW+GND
			CABLE - P2	DW780-J14	
3	7014212-2M	CABLE AC DC LOW	CABLE - P1	KA780-J16	AC,DC LOW+GND
			CABLE - P2	ITEM #6-J1	
4	7014212-2M	CABLE AC DC LOW	CABLE - P1	PS#2 - J3	AC,DC LOW+GND
			CABLE - P2	ITEM #6-J2	
5	7014212-0M	CABLE AC DC LOW	CABLE - P1	PS#3 - J3	AC,DC LOW+GND
			CABLE - P2	KA780-J15	
6	70 -0J	AC DC LOW WYE CABLE	CABLE - P1	MS780-J16	AC,DC LOW+GND
			CABLE - J1	ITEM #3-P2	
			CABLE - J2	ITEM #4-P2	
7	7014212-1C	CABLE AC DC LOW	CABLE - P1	PS#4 - J3	AC,DC LOW+GND
			CABLE - P2	MS780-J20	
8	7014212-0K	CABLE ±5B + +12V	CABLE - P1	PS#4 - J7	±5B + +12V+GND
			CABLE - P2	MS780-J17	
			CABLE - P3	MS780-J14	
9	7014249-1A	CABLE POWER (BLK)	PS#2 + 5 RET - D	DW780+5 RET-B	PS#2 + 5 RETURN
10	7014249-1A	CABLE POWER (BLK)	PS#2 + 5 RET - C	DW780+5 RET-C	
11	7014249-1C	CABLE POWER (BLK)	PS#2 + 5 RET - B	KA780+5B RET-B	
12	7014249-1C	CABLE POWER (BLK)	PS#2 + 5 RET - A	KA780+5B RET-C	PS#2 + 5 RETURN
13	7014530-1A	CABLE POWER (RED)	PS#2 + 5V - D	DW780+5V-B	PS#2 + 5V
14	7014530-1A	CABLE POWER (RED)	PS#2 + 5V - C	DW780+5V-C	
15	7014530-1A	CABLE POWER (RED)	PS#2 + 5V - B	KA780+5B-C	
16	7014530-1A	CABLE POWER (RED)	PS#2 + 5V - A	KA780+5B-B	PS#2 + 5V
17	7014249-1J	CABLE POWER (BLK)	PS#3 + 5V RET - D	KA780+5C RET-D	
18			-C	-C	
19			-B	-B	
20	7014249-1J	CABLE POWER (BLK)	PS#3 + 5V RET - A	KA780+5C RET-A	PS#3 + 5 RETURN
21	7014530-1E	CABLE POWER (RED)	PS#3 + 5V - D	KA780+5C - D	PS#3 + 5 RETURN
22			-C	-C	
23			-B	-B	
24	7014530-1E	CABLE POWER (RED)	PS#3 + 5V - A	KA780+5C - A	
25	7016951-0-0	UNIBUS PWR HARNESS	HARNESS - P1	PS#5 - J10	PS#5 + 15V, -15V+GND
			HARNESS (RING TERM) (BLK WIRE) - P2	PS#5 + 5 RET - D	PS#5 + 5 RETURN
			HARNESS - P3	PS#5 - J3	AC,DC LOW+GND
			HARNESS (RING TERM) (RED WIRE) - P4	PS#5 + 5V - D	PS#5 + 5V
			-P5	-C	
			-P6	-B	
			HARNESS (RING TERM) (RED WIRE) - P7	PS#5 + 5V - A	
			HARNESS (RING TERM) (BLK WIRE) - P8	PS#5 + 5 RET - D	PS#5 + 5 RETURN
			-P9	-C	
			-P10	-B	
			HARNESS (RING TERM) (BLK WIRE) - P11	PS#5 + 5 RET - A	
	7016951-0-0	UNIBUS PWR HARNESS	HARNESS - P12	ADAPTER BOARD-J1	AC,DC LOW+GND

## REVISION HISTORY

DATE	ECO NUMBER	REV.

TITLE 11780 SUB-SYSTEM  
INTERCONNECT

SIZE CODE 11780-0-3  
REV. B  
SCALE 1 OF 8

## 11780-CU/CV

REF ITEM NUMBER	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
25	7016951-0-0	UNIBUS PWR HARNESS	HARNESS - P13	ADAPTER BOARD-J2	ADAPT. AC,DC LOW+GND
			-P14		N.C.(OPTIONAL)
			-P15	RK611 - P2	
			-P16	RK611 - P3	
			-P17	RK611 - P4	
			-P18	N.C.(OPTIONAL)	
			-P19		
			-P20		
	7016951-0-0	UNIBUS PWR HARNESS	HARNESS - P21		N.C.(OPTIONAL)
29	7014250-0K	CABLE POWER RTR MEMORY (BLK)	PS#4 + 5V RET - C	MS780-J15-A	PS#4 + 5 RETURN
30			-D	-B	
31	7014529-0K	CABLE POWER +5 MEMORY (RED)	PS#4 + 5V - C	MS780-J18-A	PS#4 + 5V
32			-D	-B	
33	7014243-3M	CABLE TO T.Q.D. BAT.	HARNESS - P2	KA780-J20	
			-P1	H7111 - J1	
34	7014243-21	FLOPPY RELAY SC PWR HARNESS	HARNESS - P1	KA780-J19	
			-P2	SCP - J3	
			-P3	RX0 - J1	
35	7014249-0L	CABLE POWER (BLK)	KA780+5A RET-D	FRAME	
56	7014212-0M	CABLE AC/DC LO	CABLE - P1	DW780-J13	SEE NOTE #3
			CABLE - P2	KA780-J17	

FP780

OR  
FP780 + KU780

SEE NOTE

48	7014249-0L	POWER CABLE (BLK)	PS#1 + 5A RET - D	KA780+5A RET-D	PS#1 + 5 RETURN
49			-C	-C	
50			-B	-B	
51	7014249-0L	POWER CABLE (BLK)	PS#1 + 5A RET - A	KA780+5A RET-A	
52	7014530-0L	POWER CABLE (RED)	PS#1 + 5V - D	KA780+5A - D	PS#1 + 5A
53			-C	-C	
54			-B	-B	
55	7014530-0L	POWER CABLE (RED)	PS#1 + 5V - A	KA780+5A - A	
56	7014212-0M	CABLE AC DC LO	CABLE - P1	PS#1 - J3	AC,DC LOW+GND
			CABLE - P2	KA780-J17	

SEE NOTE 3

KC780 OR KU780

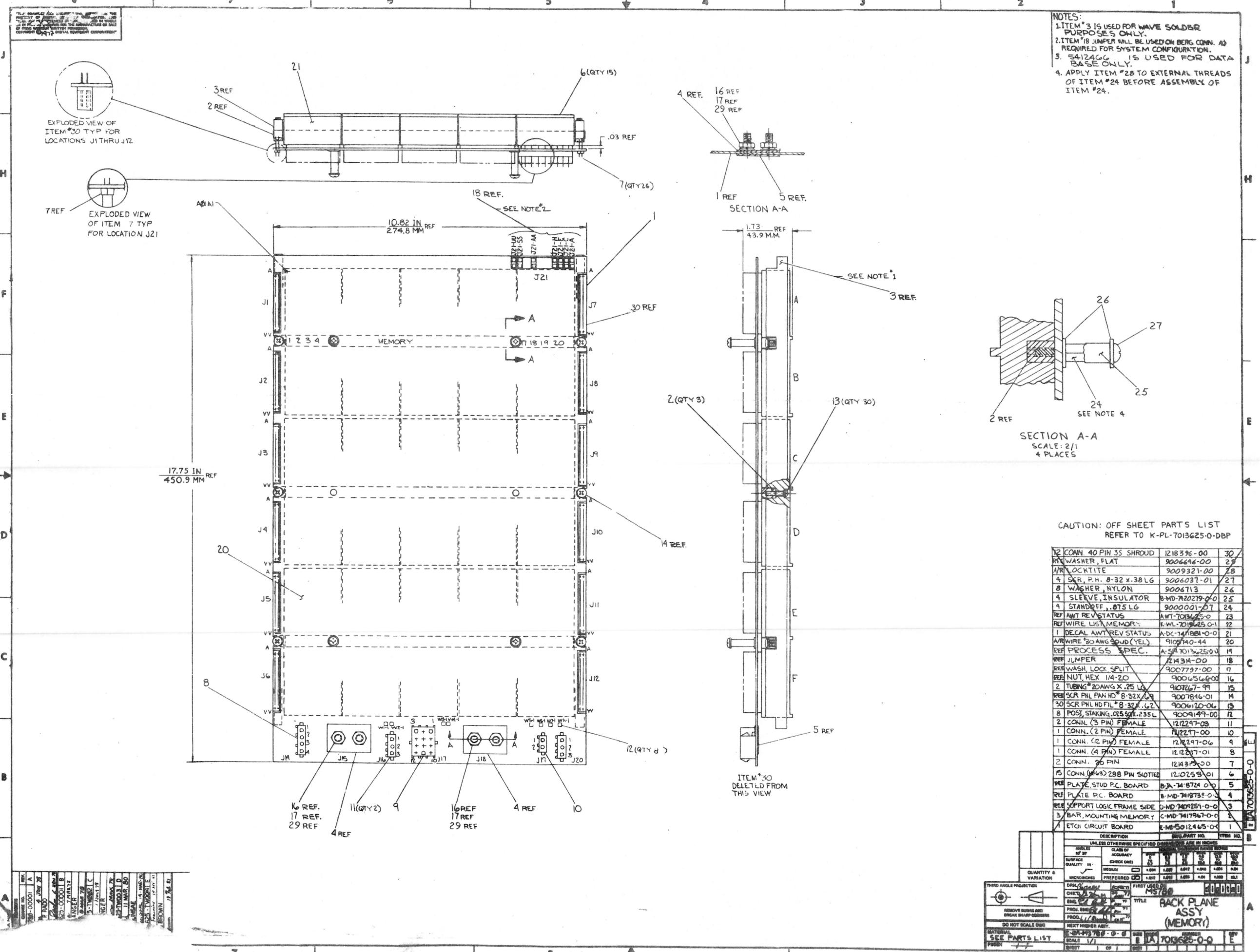
SEE NOTE 2

57	7014530-0L	CABLE POWER (RED)	KA780 + 5A - D	KA780+5C - B	PS#2 + 5V
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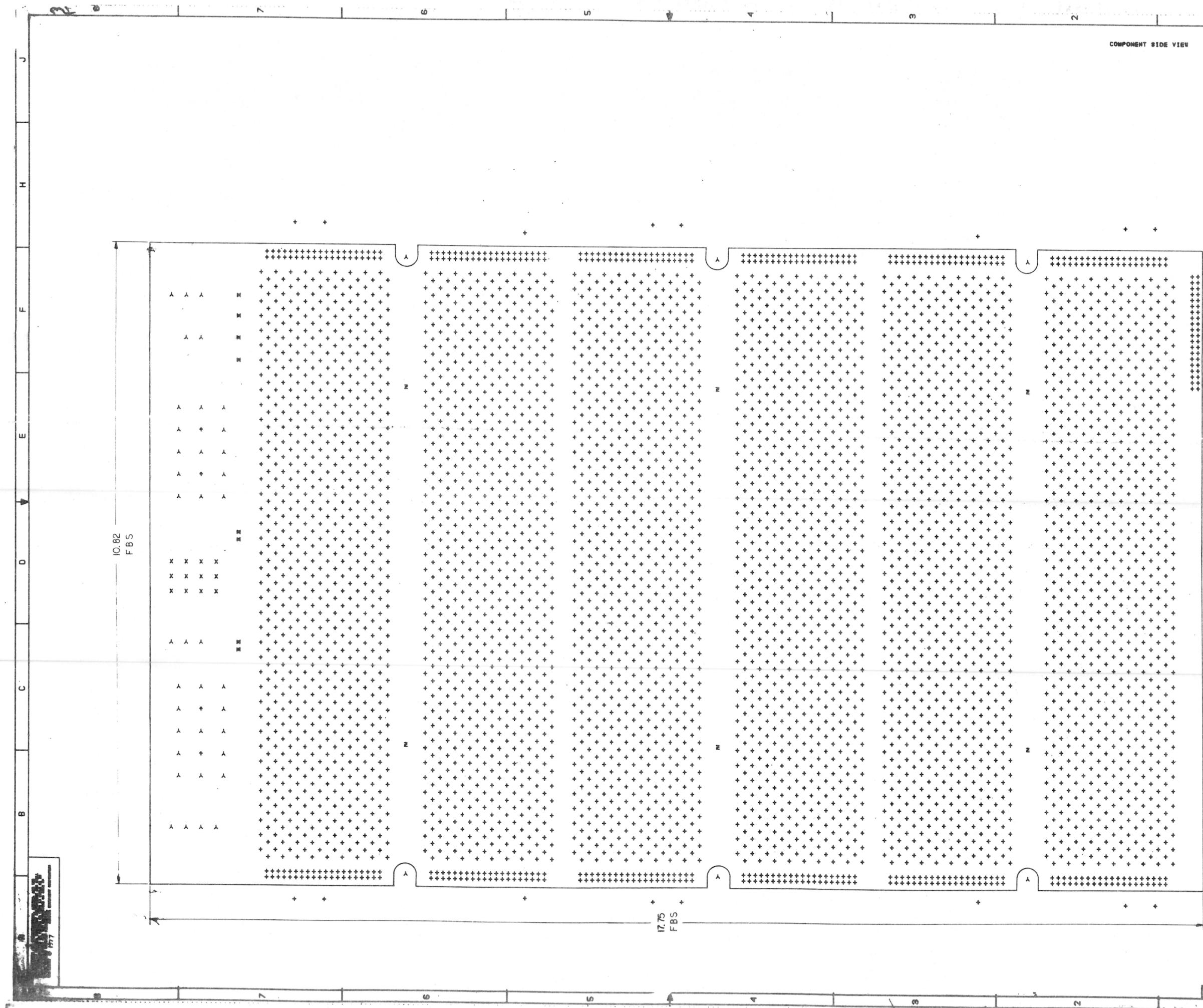
THIS SHEET FOR  
CU+CV VARIATION  
ONLY

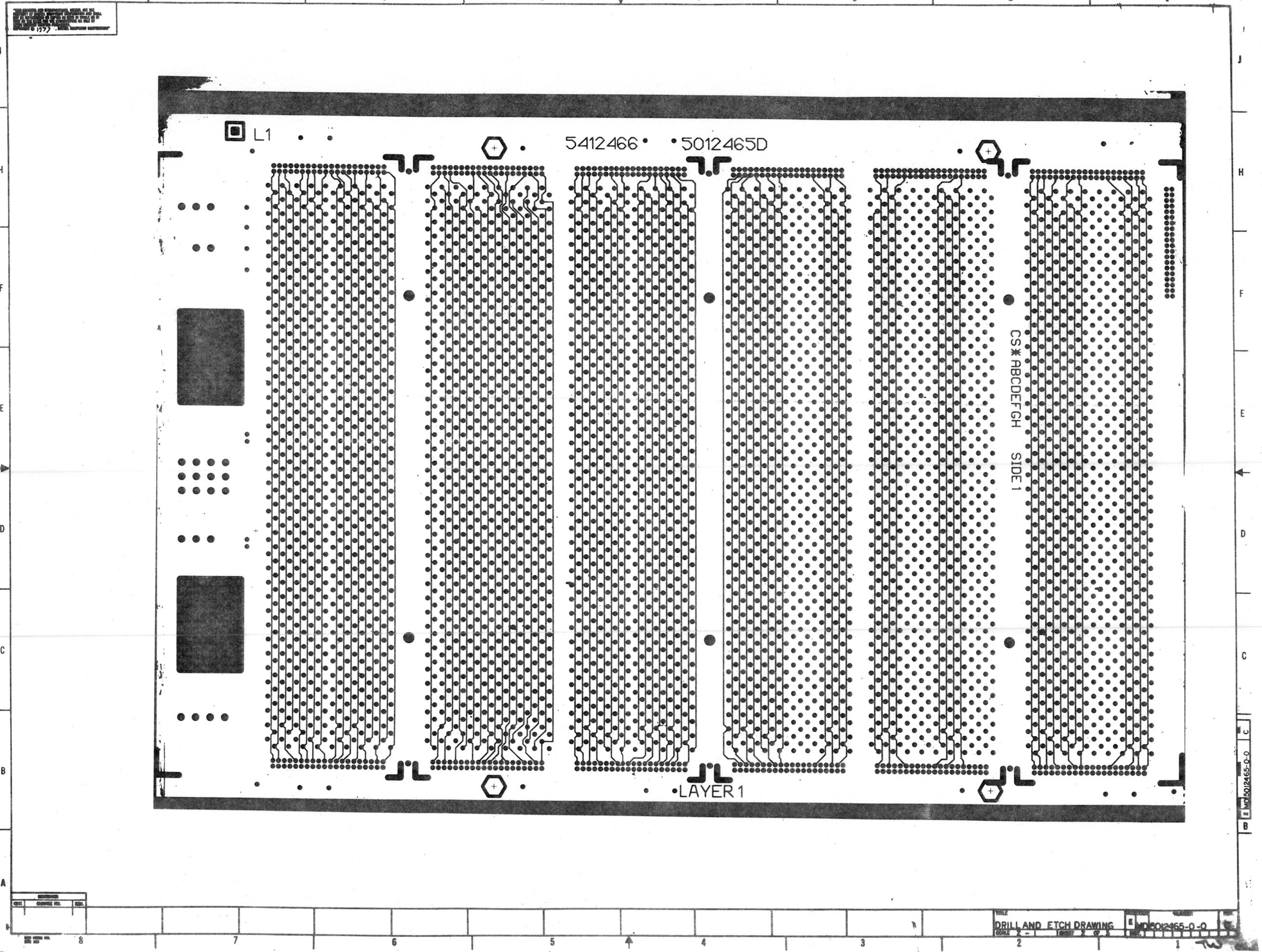
## NOTES:

1. REFER TO E-UA-KA780 FOR INSTRUCTIONS OF JUMPER REMOVAL IN CONFIGURATIONS USING PS#1
2. IF THE FP780 IS INSTALLED, REMOVE ITEM 57.
3. IF THE FP780 IS INSTALLED: ITEM #56 PI CONNECTS TO PS#1 - J3 OTHERWISE IT IS CONNECTED TO DW780 - J13.



**COMPONENT SIDE VIEW**





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A

REVISIONS		
CHG.	CHANGE NO.	REV.

DRC FORM NO. 8

DRC 106

8

7

6

5

4

3

2

1

B

GND

LAYER 2

H

F

J

J

I

H

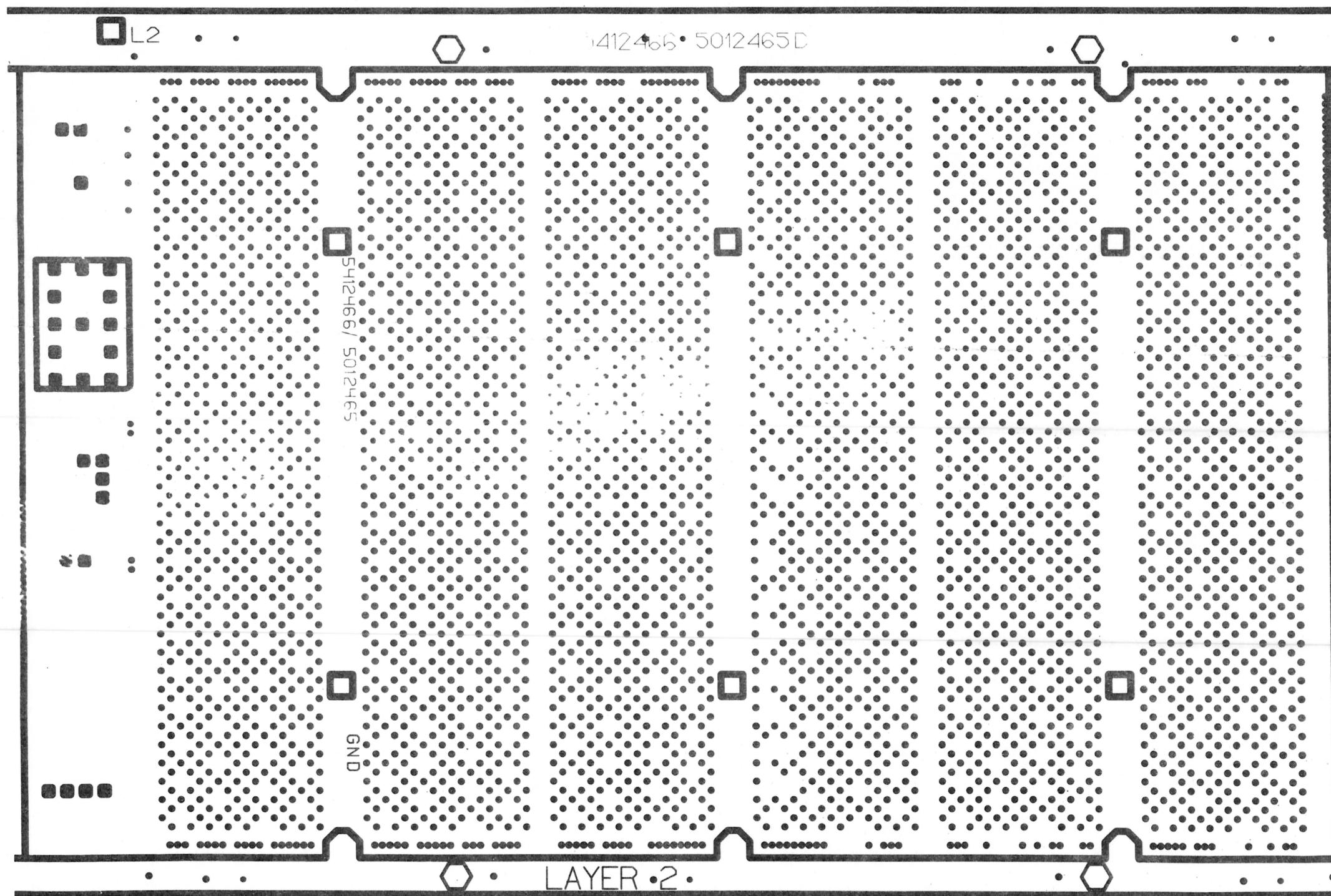
E

D

C

B

A



TITLE DRILL AND ETCH DRAWING  
SCALE 2-1 SHEET 3 OF 5  
REV. E MD.5012465-0-0  
NUMBER 1 REV. C

REV. C  
MD.5012465-0-0

B

REV. C  
MD.5012465-0-0

C

B

REV. C  
MD.5012465-0-0

D

REV. C  
MD.5012465-0-0

E

REV. C  
MD.5012465-0-0

F

REV. C  
MD.5012465-0-0

G

REV. C  
MD.5012465-0-0

H

REV. C  
MD.5012465-0-0

I

REV. C  
MD.5012465-0-0

J

REV. C  
MD.5012465-0-0

K

REV. C  
MD.5012465-0-0

L

REV. C  
MD.5012465-0-0

M

REV. C  
MD.5012465-0-0

N

REV. C  
MD.5012465-0-0

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LAYER 3

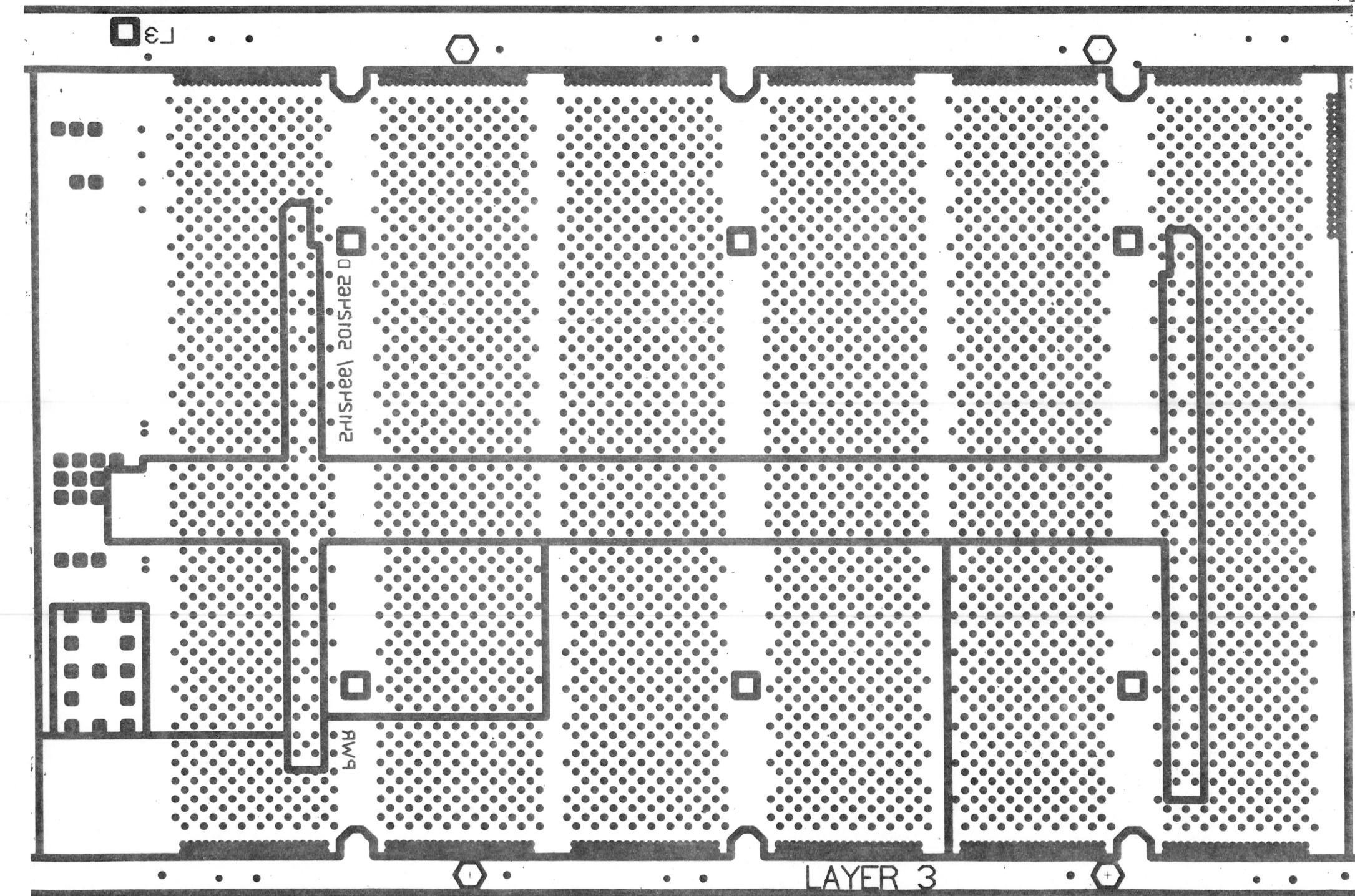
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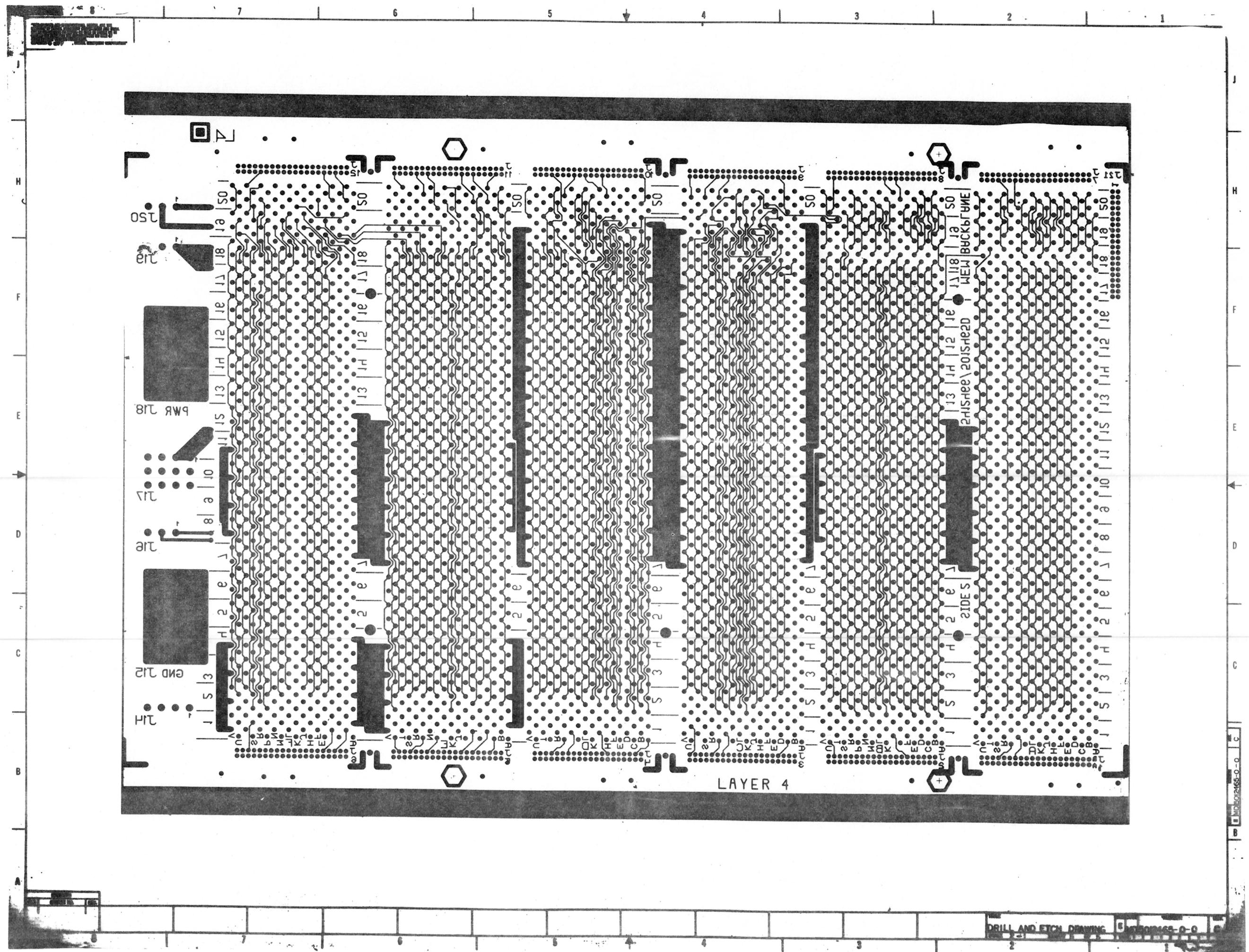
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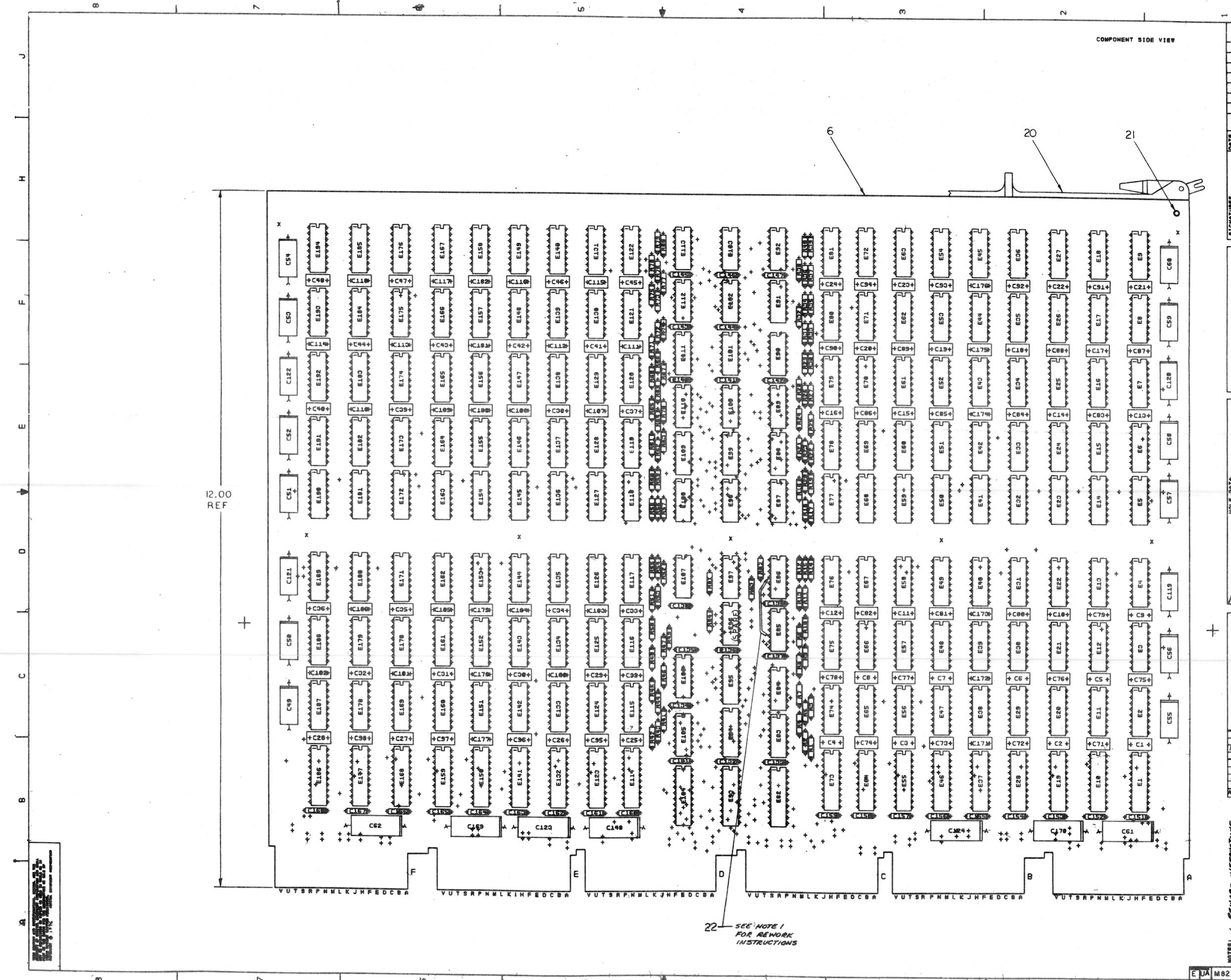
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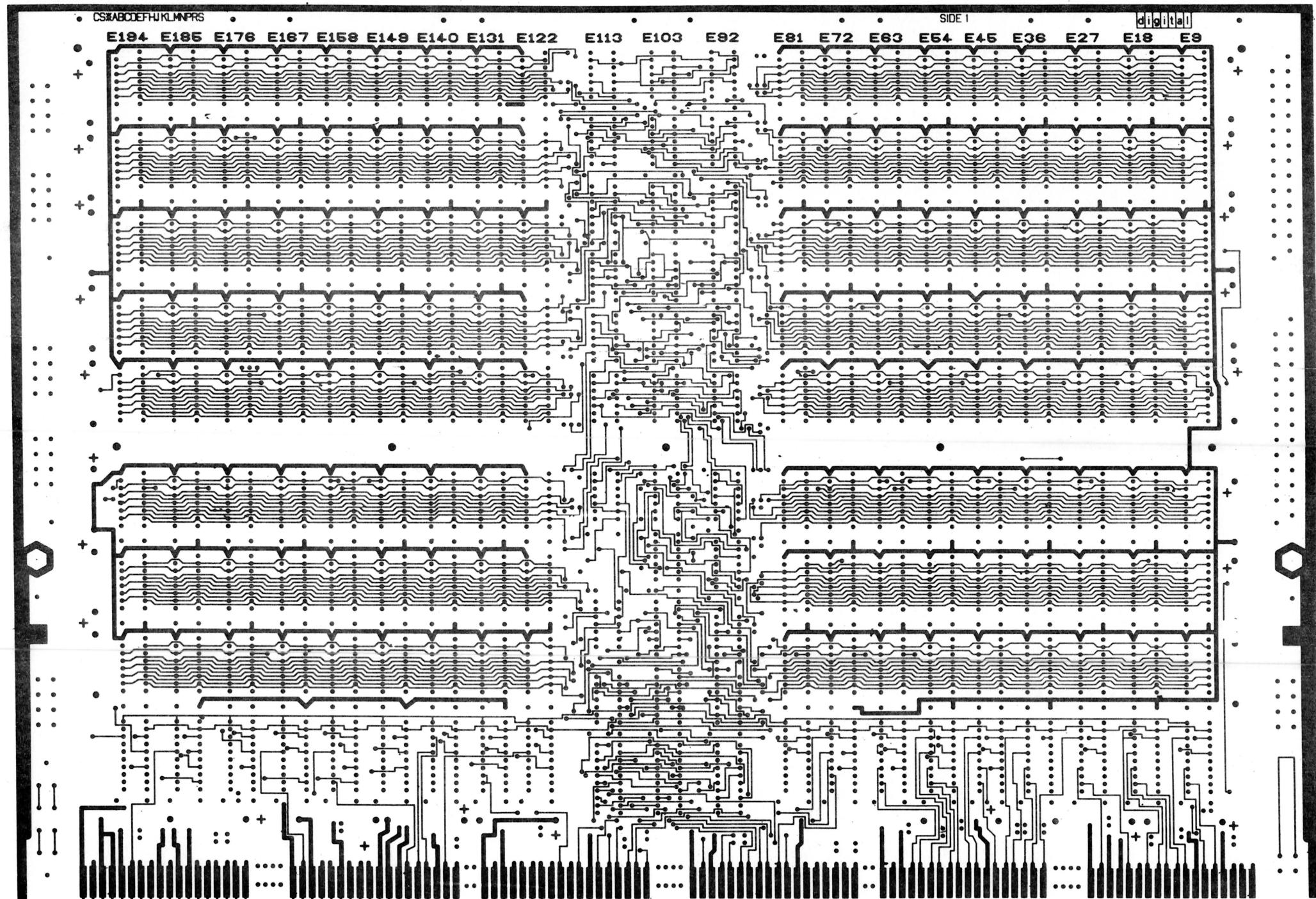




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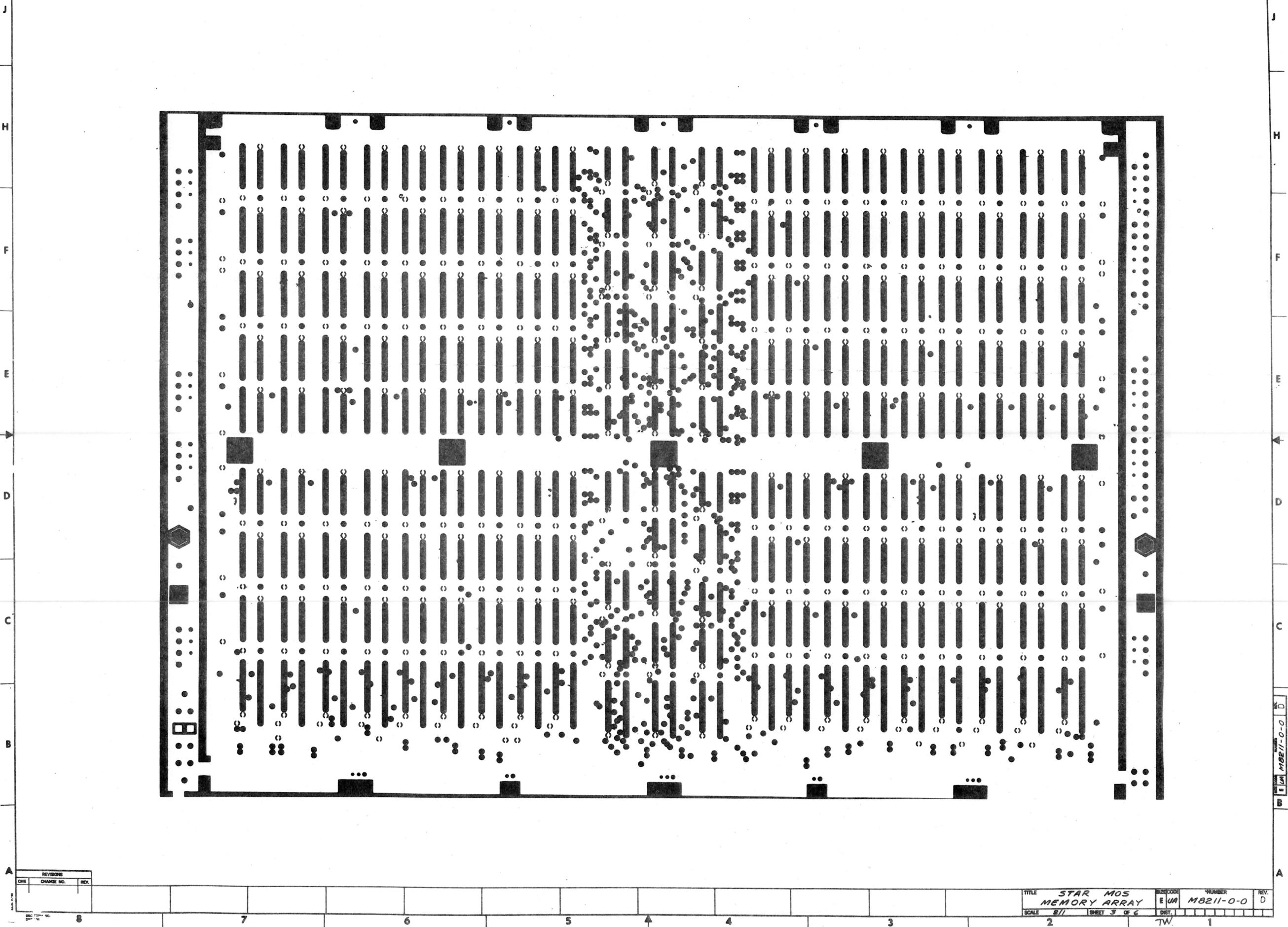
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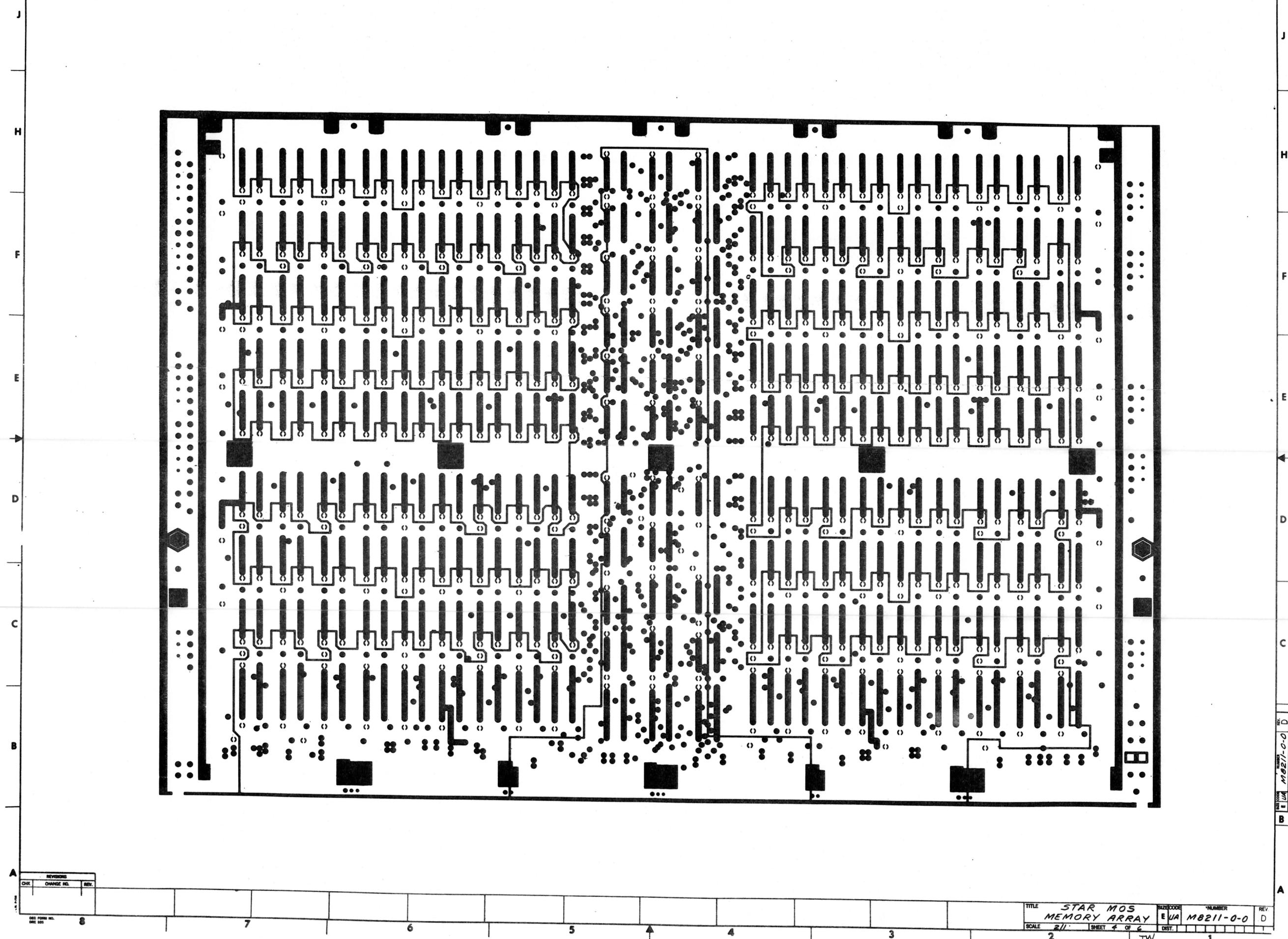
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TITLE		STAR MOS MEMORY ARRAY	INDEX CODE	E UA	NUMBER	M8211-0-0	REV.	D
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REVISIONS		
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GSA GEN. REG. NO. 2710-00-0000		

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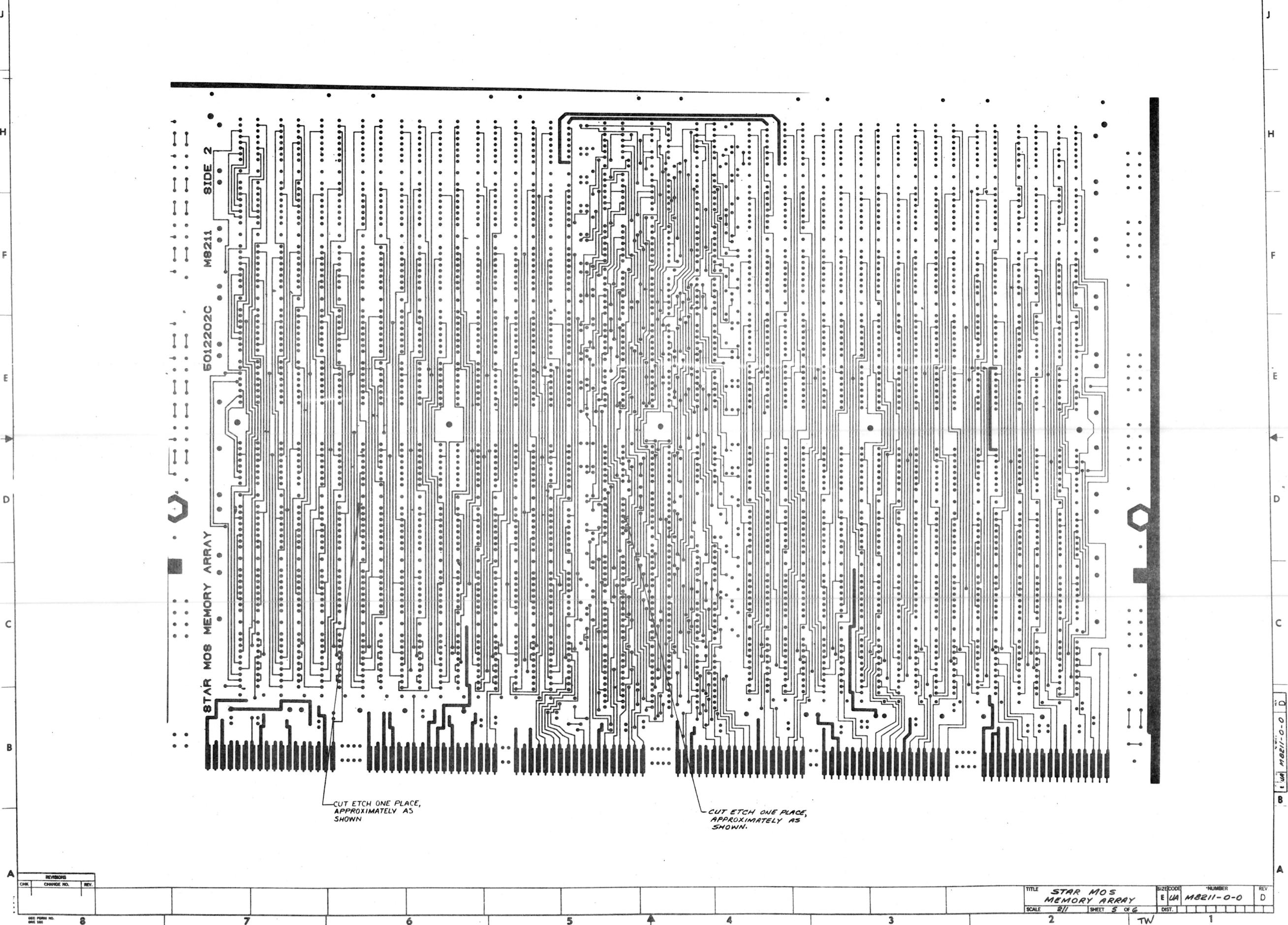
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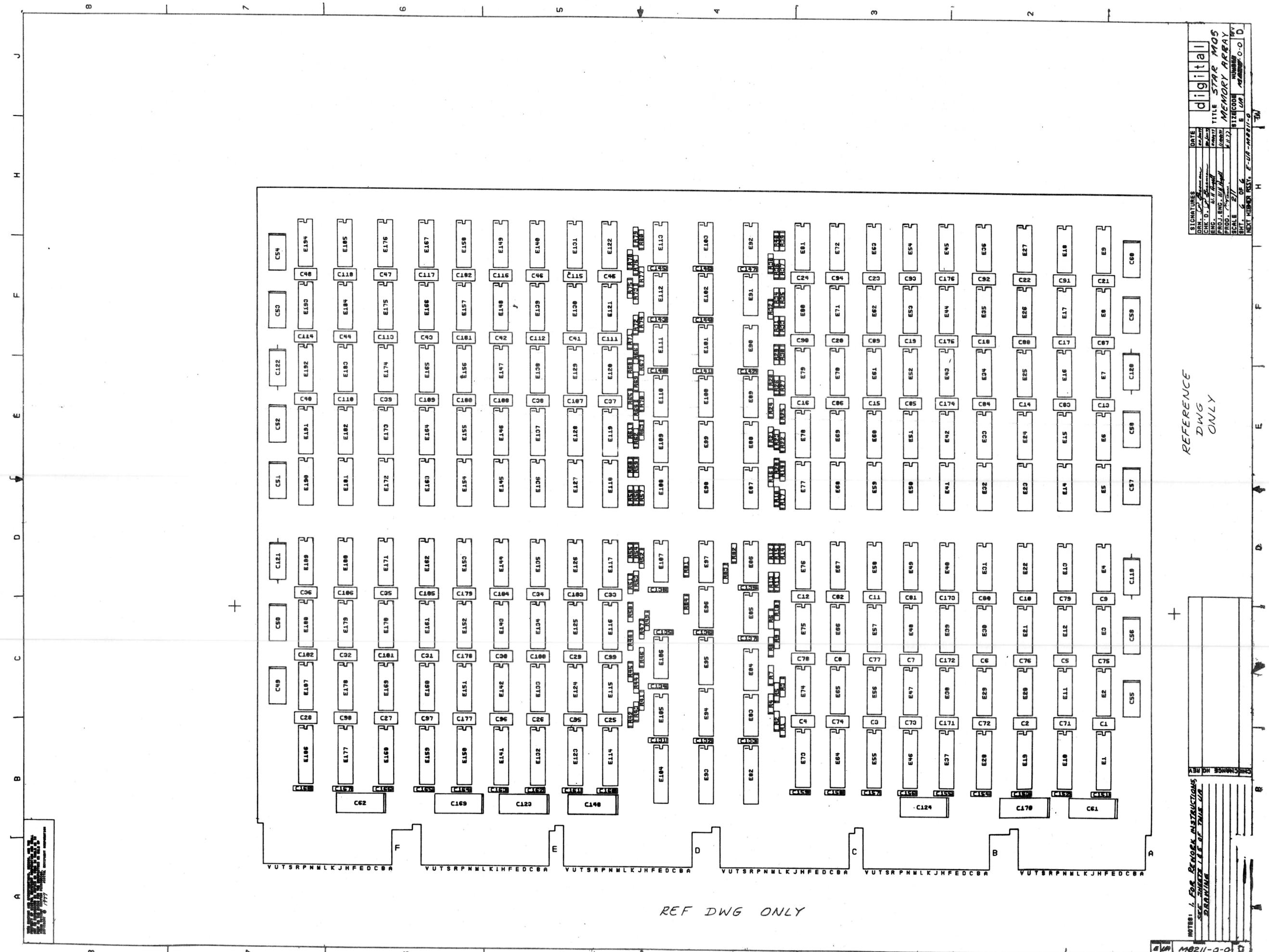
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TITLE: STAR MOS  
MEMORY ARRAY  
SIZE/CODE: E/UA  
NUMBER: M8211-0-0  
REV: D  
SCALE: 211  
SHEET 4 OF 6  
DIST. 1  
2 TW 1



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LINE ITEM	DOCUMENT NUMBER	PART NUMBER	DESCRIPTION	QTY PER VARIATION	REFERENCE DESIGNATOR
				AB AC	
1	1	D-CS-M8211-0-1	CIRCUIT SCHEMATIC	REF REF	
2	2	F-UA-M8211-0-0	UNIT ASSEMBLY	REF REF	
3	3	B-DD-M8211-0-0	DWG.DIRECTORY	REF REF	
4	4	E-MD-5012202-0-0	DRILL &ETCH DRAWING	REF REF	
5	5	A-SP-M8211-0-0	SPECIFICATION, MODULE	REF REF	
6	6		ETCH BRD M8211	1 1	
7	7	5012202-00			
8	8	1012784-00	.047 MFD 50V -20+80 CER	35 35	C131-C147,C151-C168
9	9	1001796-00	50 MFD 25V G% 30D AL EL	7 7	C61,C62,C123,C124,C148,C169,C170
10	10	1012084-01	8 MFD 25V G% 30D AL EL	16 16	C49-C60,C119-C122
11	11	1010274-00	.22 MFD 50V -20+80 25U CER	108 108	C1-C48,C71-C118,C171-C182
12	12	1300202-00	47 1/4W 5% CC	80 80	R1-R80
13	13	1300365-00	1 K 1/4W 5% CC	4 4	R81-R84
14	14	1910549-00	74S158 MUX 1 OF 2 (QUAD)	2 2	E94,E95
15	15	1912829-00	LS86 X-OR GATE-QUAD 2IN	1 1	E97
16	16	1910541-00	74S40 NAND GATE-DUAL 4IN,B	4 4	E83,E85,E86,E99
		1910532-00	74S00 NAND GATE-QUAD 2INS	21 21	E84,E87-E92,E98,E100-E103, E105-E113
17	17				CONT E82,E93,E104
18	18	1913462-00	74S240 OCTAL BUFFER, INVERTI	3 3	CONT E1,E10,E19,E28,E37,E46,E55,E64,
		1913777-00	LS240 DRIVER, LINE, OCTAL,T	18 18	CONT E73,E114,E123,E132,E141,E150, E159,E168,E177,E186
19	19	2113735-01	4K MOS RAM 200NS 1	144 0	CONT E2-E9,E11-E18,E20-E27,E29-E36, E38-E45,E47-E54,E56-E63,E65-E72, CONT E74-E81,E124-E131,E133-E140, CONT E142-E149,E151-E158,E160-E167, CONT E169-E176,E178-E185,E187-E194, CONT E115-E122
20	20	1210711-A2	HANDLE, MODULE, HEX	1 1	
21	21	9000024-01	EYELET, ROLLED FLANGE, .121 OD X	12 12	

REVISION HISTORY		BASIC PART NO:	M8211	IDRN:	H.WEINBRENNER	DATE:	06-JUN-78	D	I	G	I	T	A	L	
ENG	ECO NUMBER	REV	SECTION & OF A									TITLE		PARTS LIST	
INITIAL		ID	SECTION, VARIATION INDEX	CHK'D:	P.BOSMAN	DATE:	06-JUN-78	STAR MOS MEMORY ARRAY							
			[A] AB,AC												
			[B]												
			[C]		DES.ENG:	W.H.ANGELL	DATE:	06-JUN-78							
			[D]												
			[E]												
			[F]		RESP.ENG.:	W.H.ANGELL	DATE:	06-JUN-78							
			[G]												
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			[K]		MFG.ENG.:	C.TANNER	DATE:	06-JUN-78	K	PL	M8211-0-DBP		D		
			[L]												
			[M]		ASSEMBLY NUMBER:		TOP DOCUMENT NUMBER:						FILE NAME:	EDIT #	
			[N]		D-0A-M8211-0-0								M8211.PLS	5	

AUTOMATED BY PRTUST.3K(26)

## PARTS LIST

SHEET A2 OF A2

LINE ITEM DOCUMENT NUMBER PART NUMBER DESCRIPTION QTY PER VARIATION AB AC REFERENCE DESIGNATOR

22	22	9105740-55	WIRE(WRAP)30AWG	UL1423	A/R	A/R	
23	23	2113914-01	4K MOS RAM 200NS 1	0 144			E2-E9,E11-E18,E20-E27,E29-E36,
					CONT		E38-E45,E47-E54,E56-E63,E65-E72,
					CONT		E74-E81,E115-E122,E124-E131,
					CONT		E133-E140,E142-E149,E151-E158,
					CONT		E160-E167,E169-E176,E178-E185,
					CONT		E187-E194

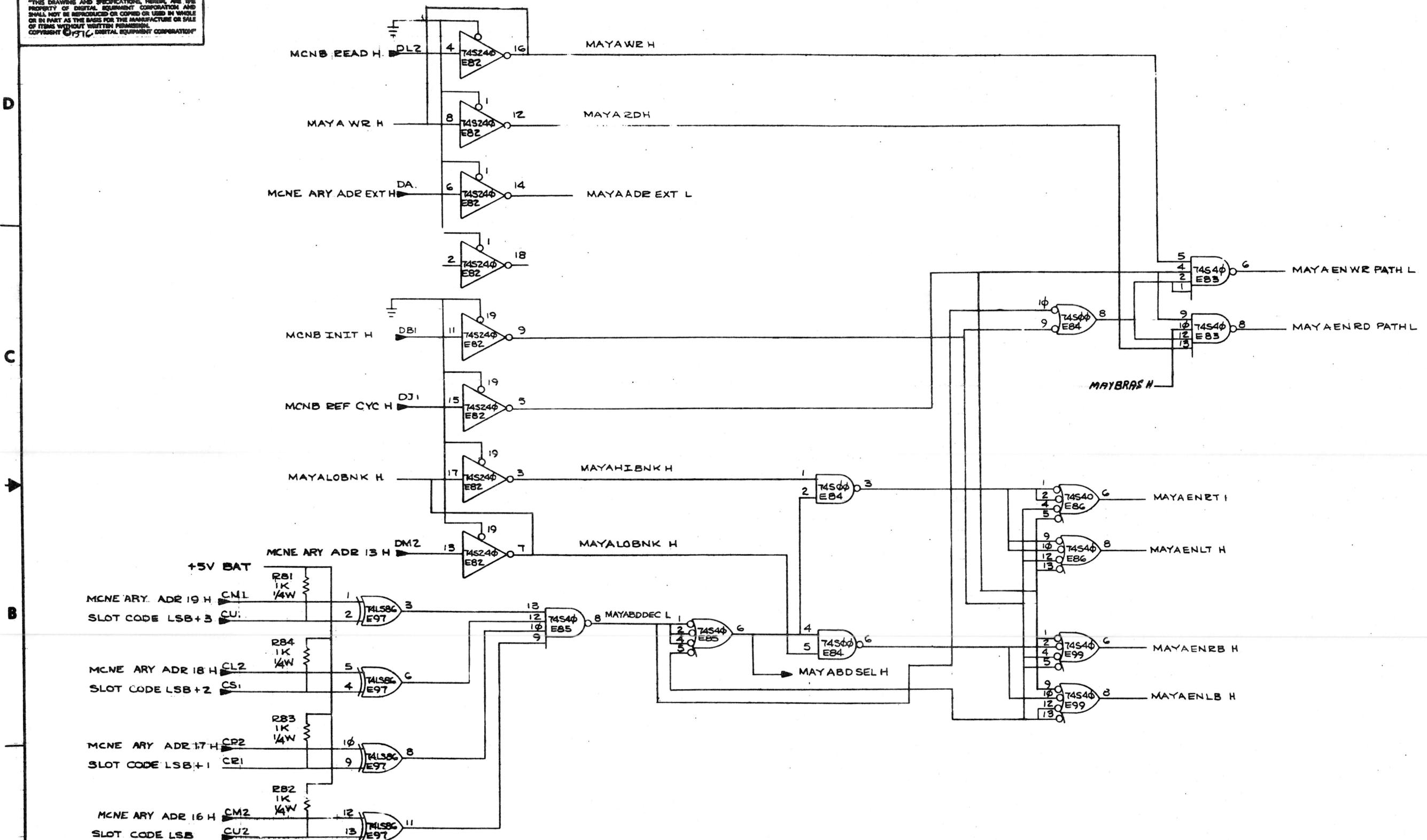
0 NOTE: MODULES WITH UNMARKED HANDLE VARIATION ARE M8211-AR.

1 NOTE: SPARE T.C. (14 PIN ) E96

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D I G I T A L	TITLE	STAR MOS MEMORY ARRAY	SECTION A OF A

! ! ! ! !	CODE	DOCUMENT NUMBER	REV
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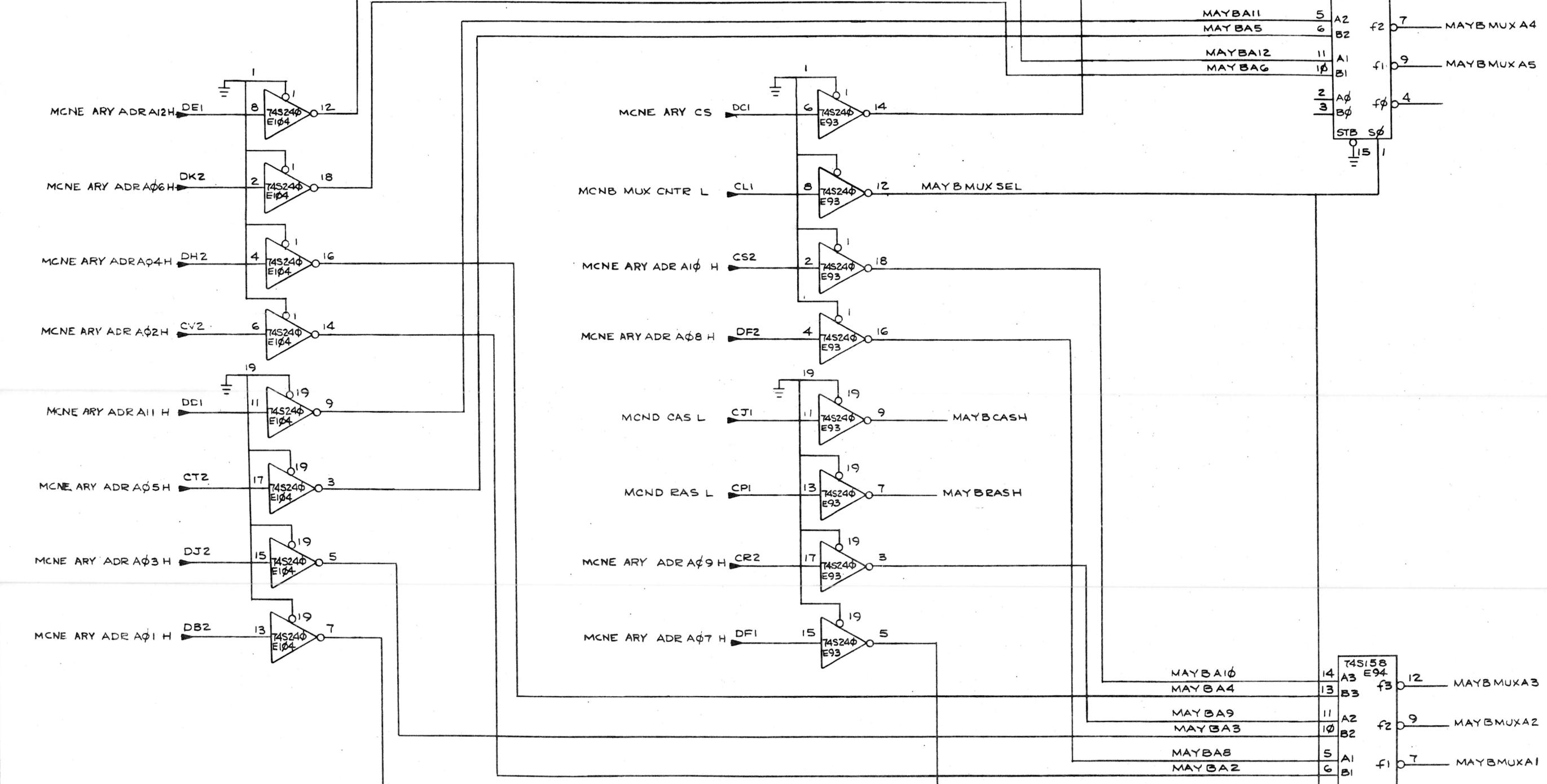
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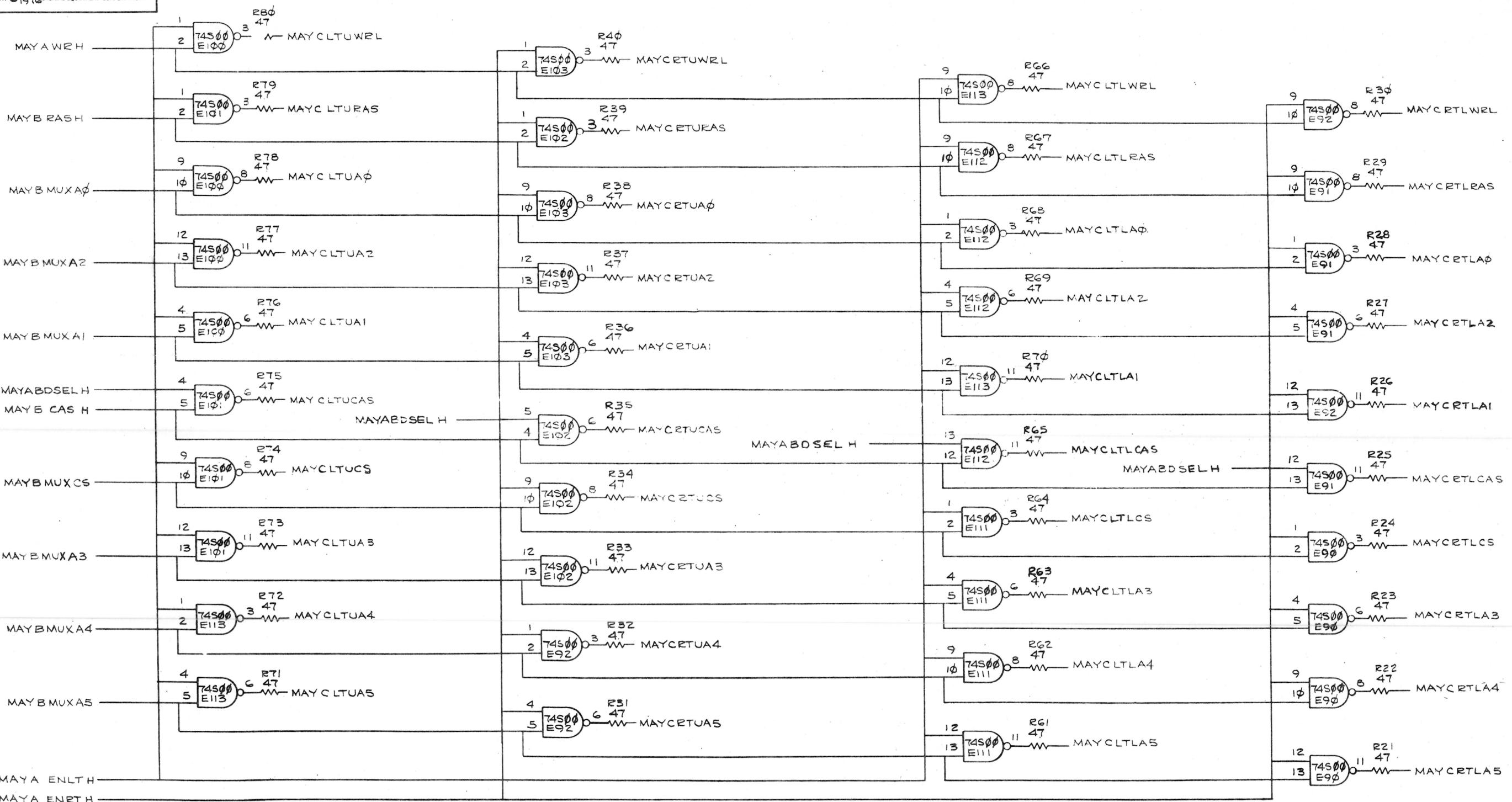
DRN. <i>W.H. Anderson</i>	42976	FIRST USED ON 11780	digital		
CHK'D <i>W.H. Anderson</i>	11/10/77	TITLE			
ENG. <i>W.H. Anderson</i>	11/10/77	11780 MOS MEMORY			
PROJ. ENG. <i>W.H. Anderson</i>	11/10/77	(16 PIN DESIGN)			
PROD. C <i>C. Young</i>	5-1177	(MAY A)			
NEXT HIGHER ASSY.					
B-DD-M8211-0		SIZE	CODE	NUMBER	REV.
SCALE	1	D	CS	M8211-0-1	E
SHEET	1	OF 17 DIST.			

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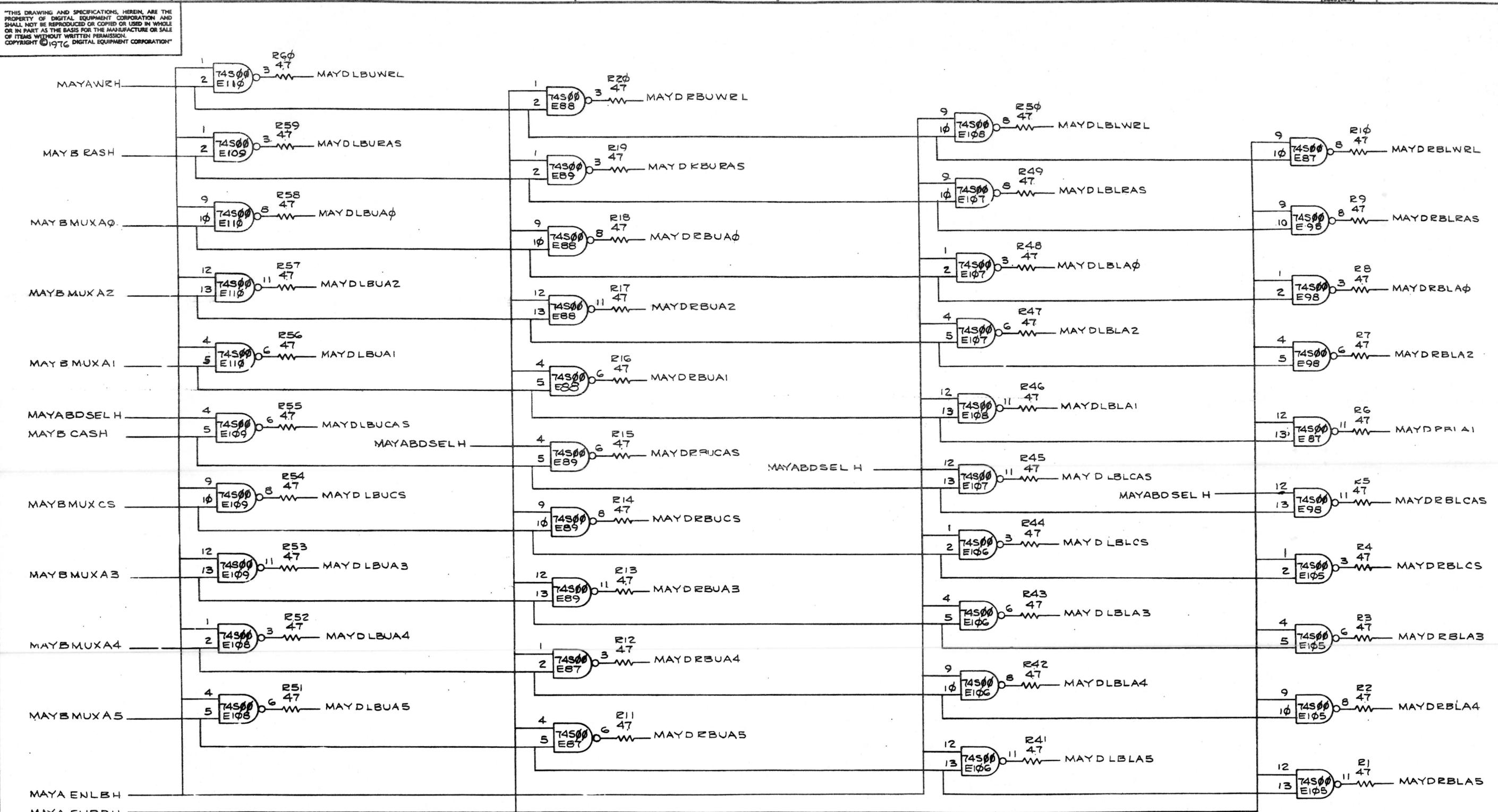
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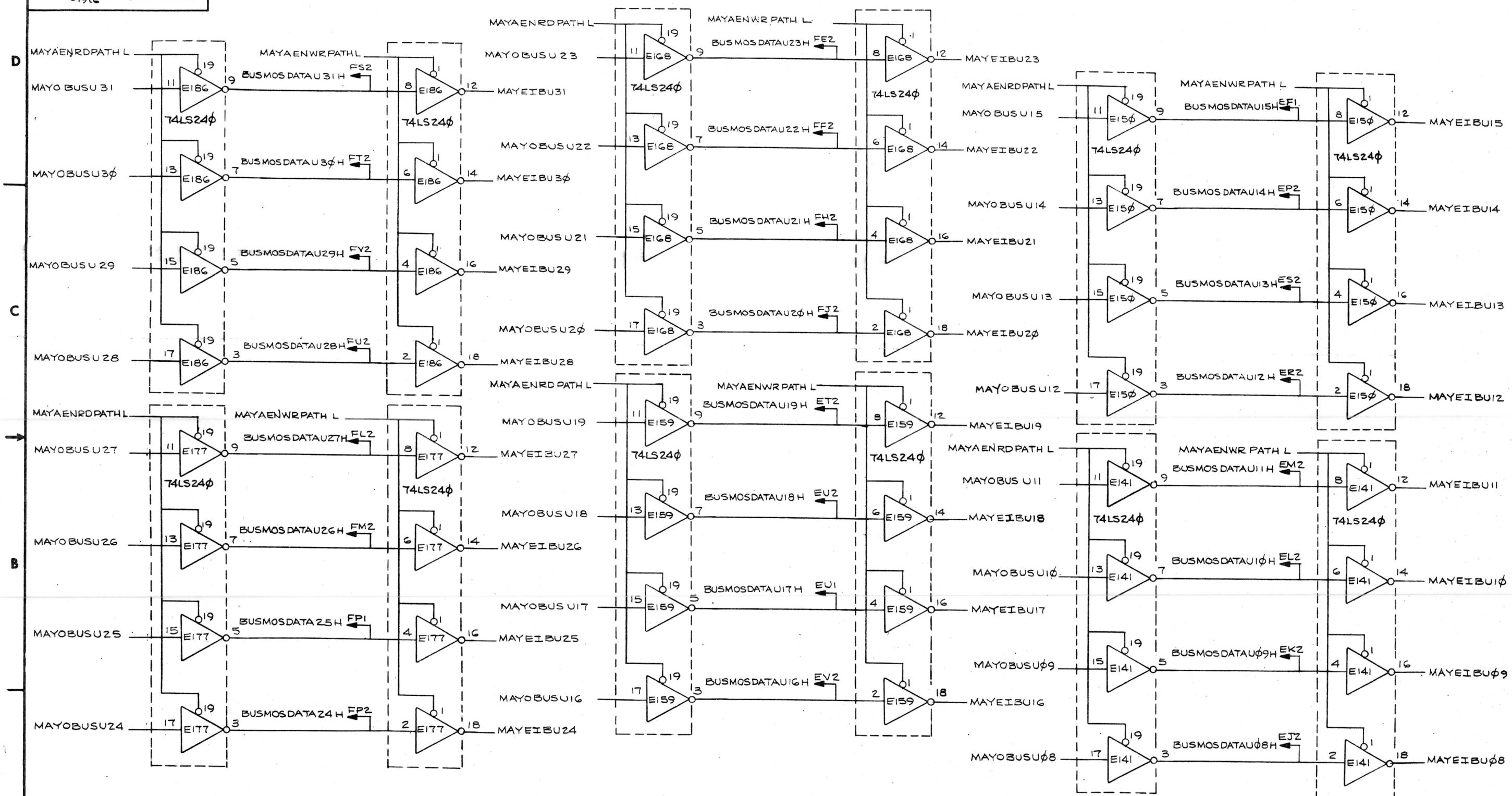
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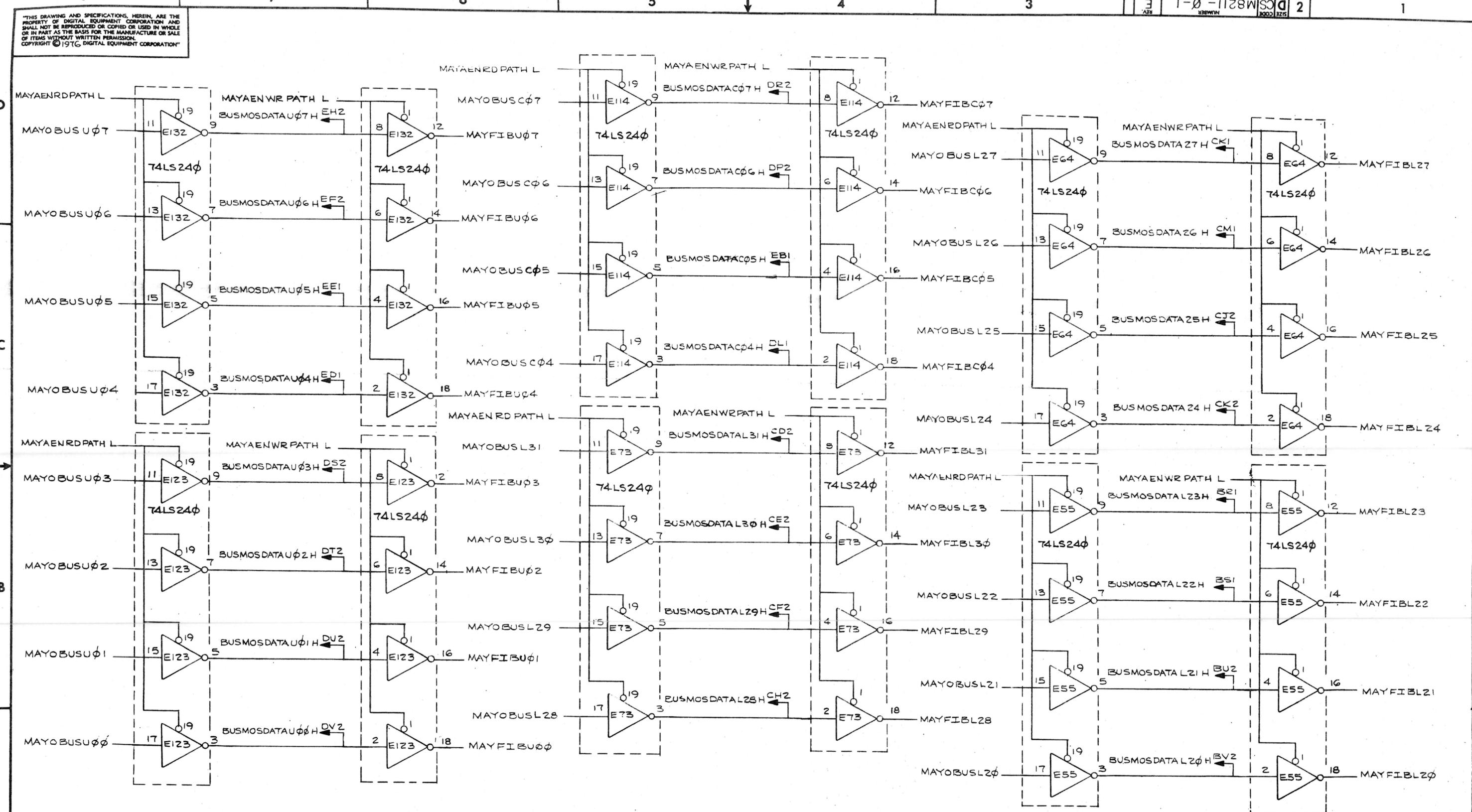
REV. E



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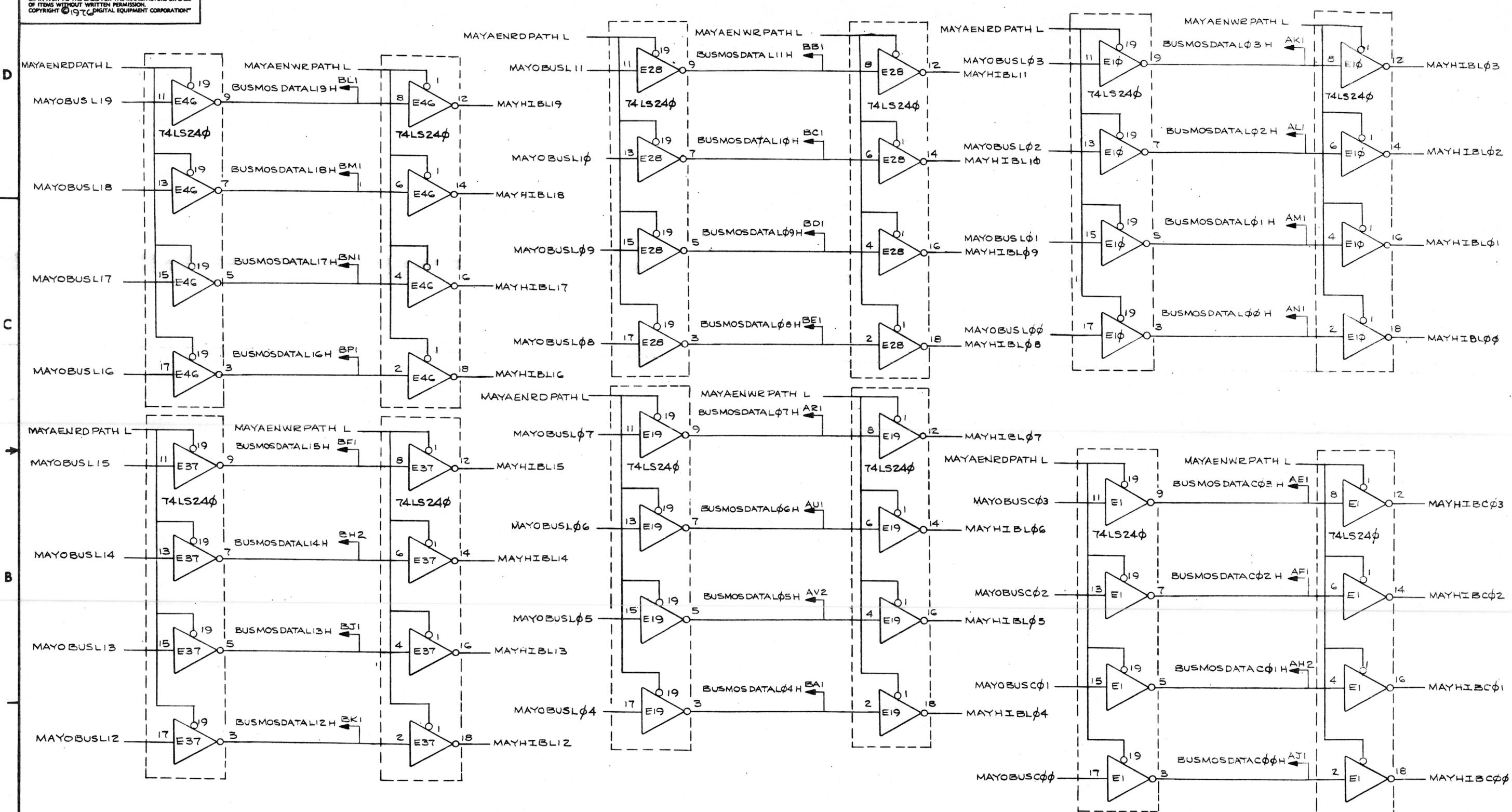
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TITLE STAR MOS MEMORY  
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SCALE / / SHEET 6 OF 17 DIST. / / TW 1

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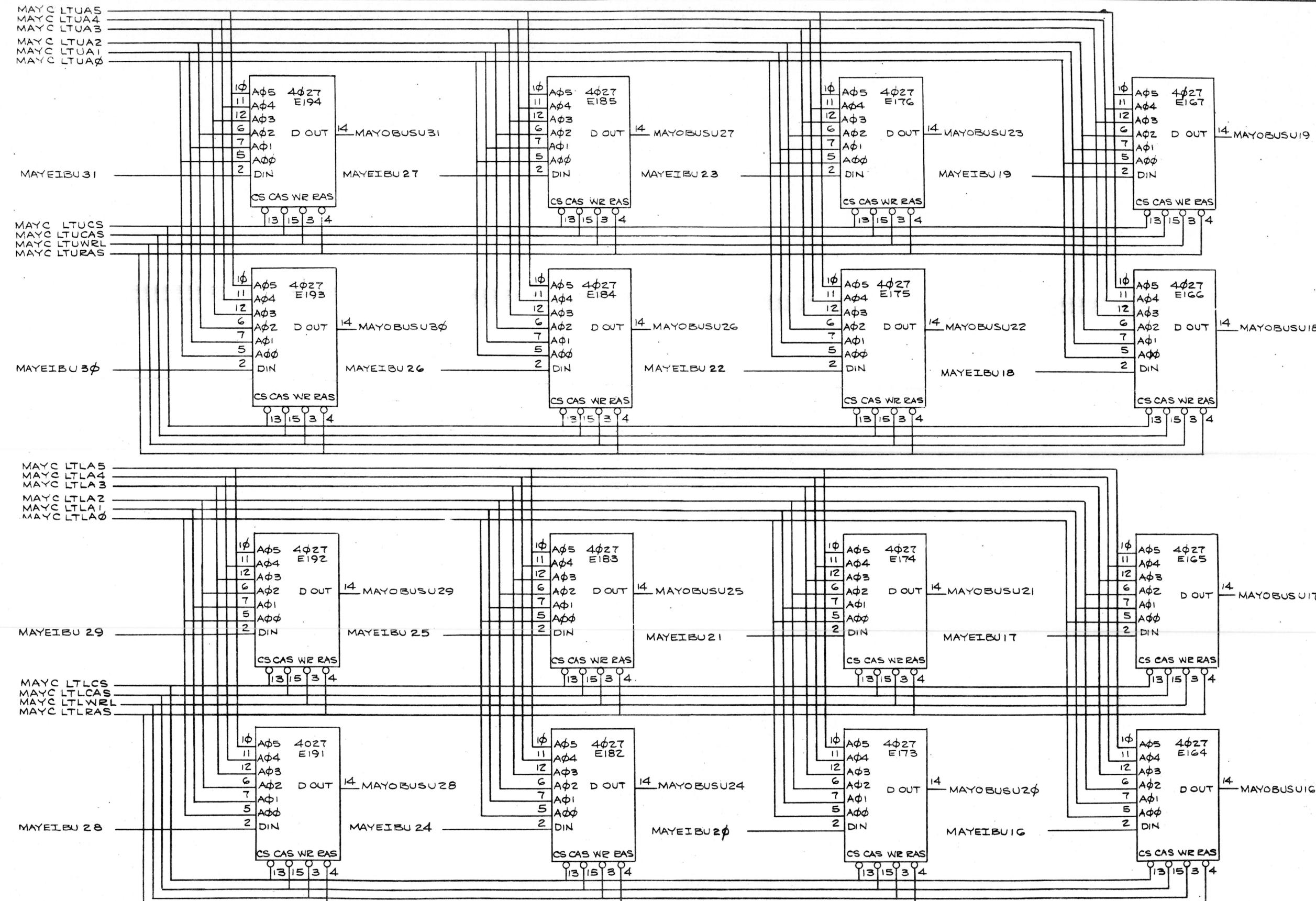
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REV. E

SCALE ← → SHEET 7 OF 17 DIST.

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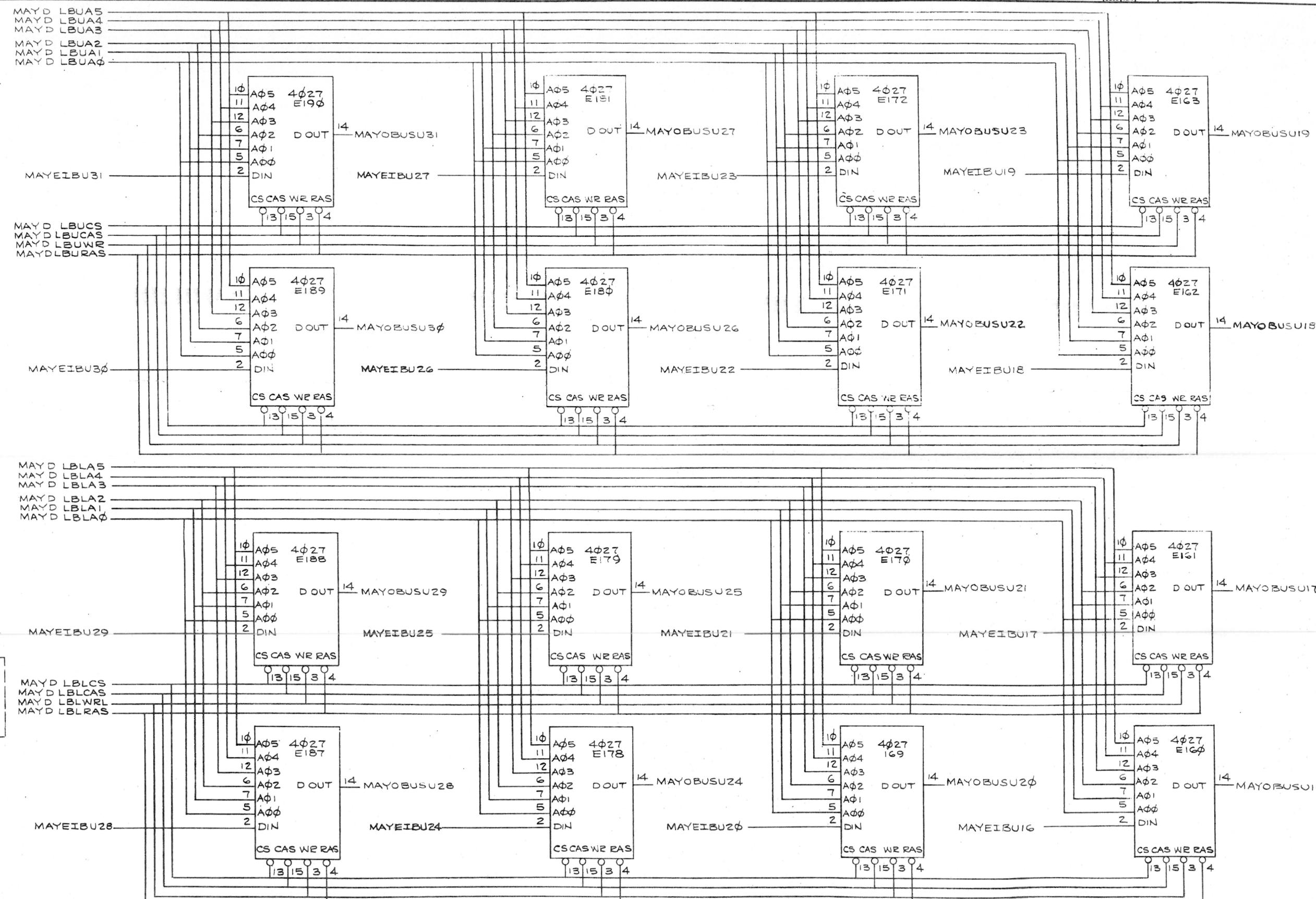
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**TITLE** STAR MOS MEMORY  
(16 PIN DESIGN)(MAY)

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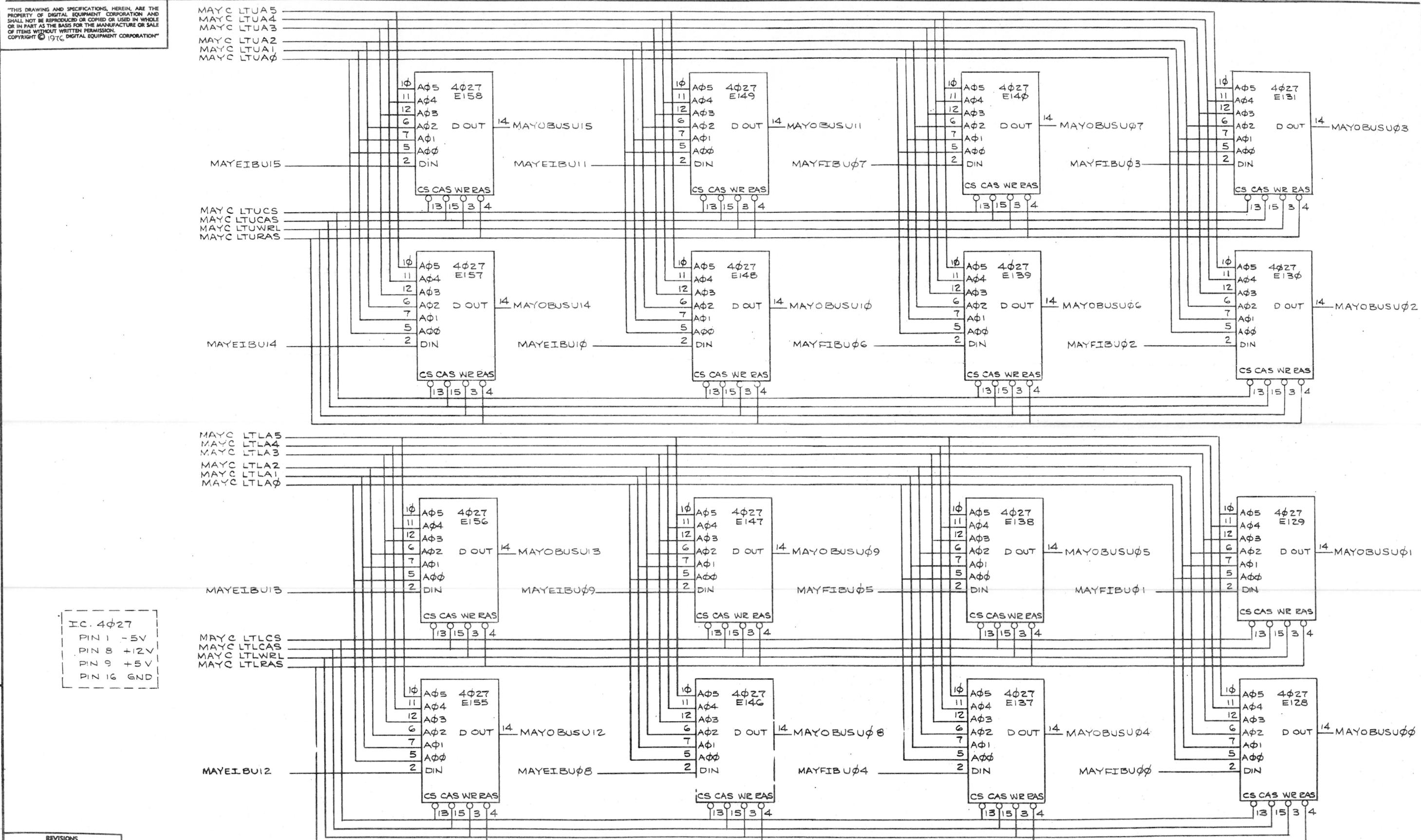
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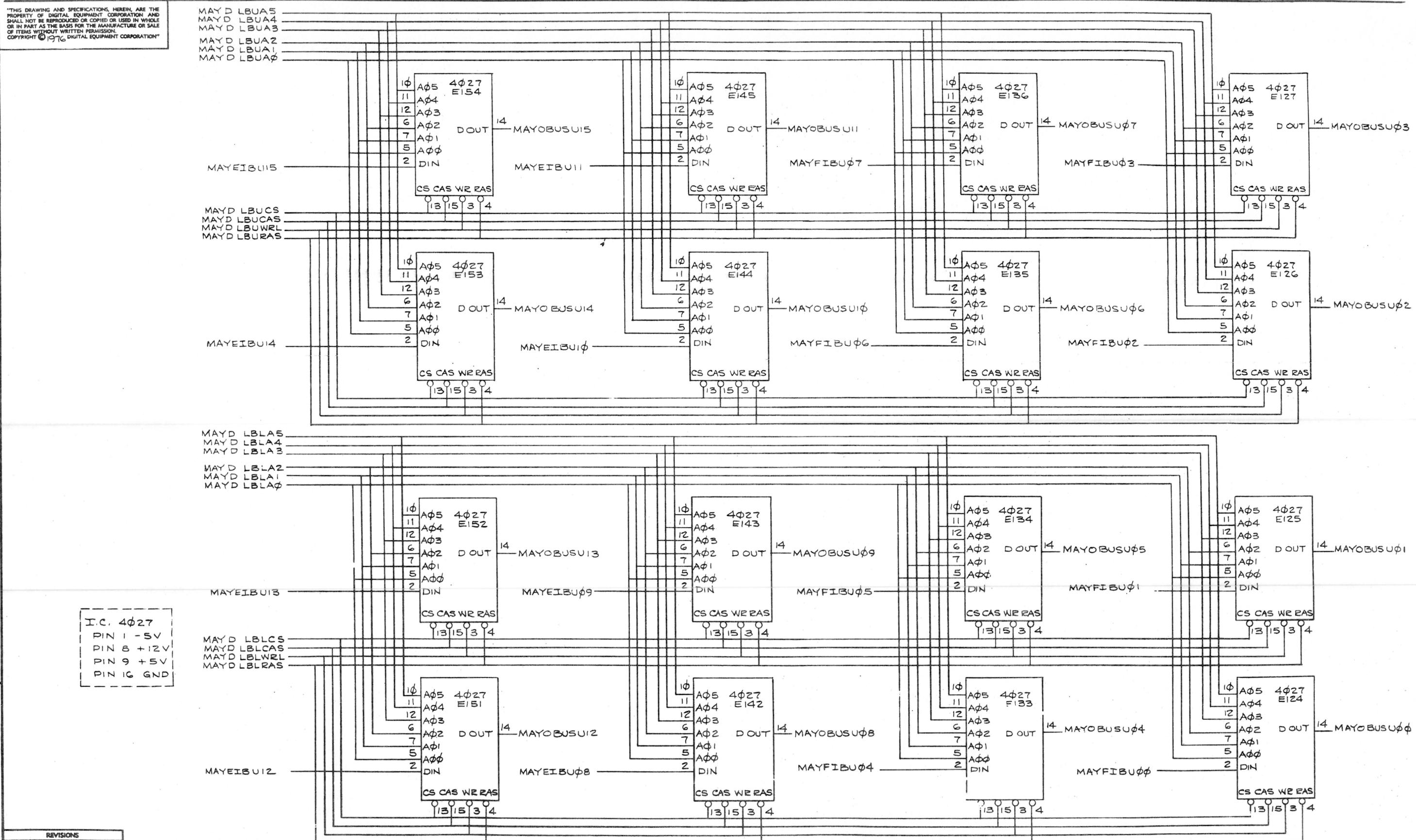
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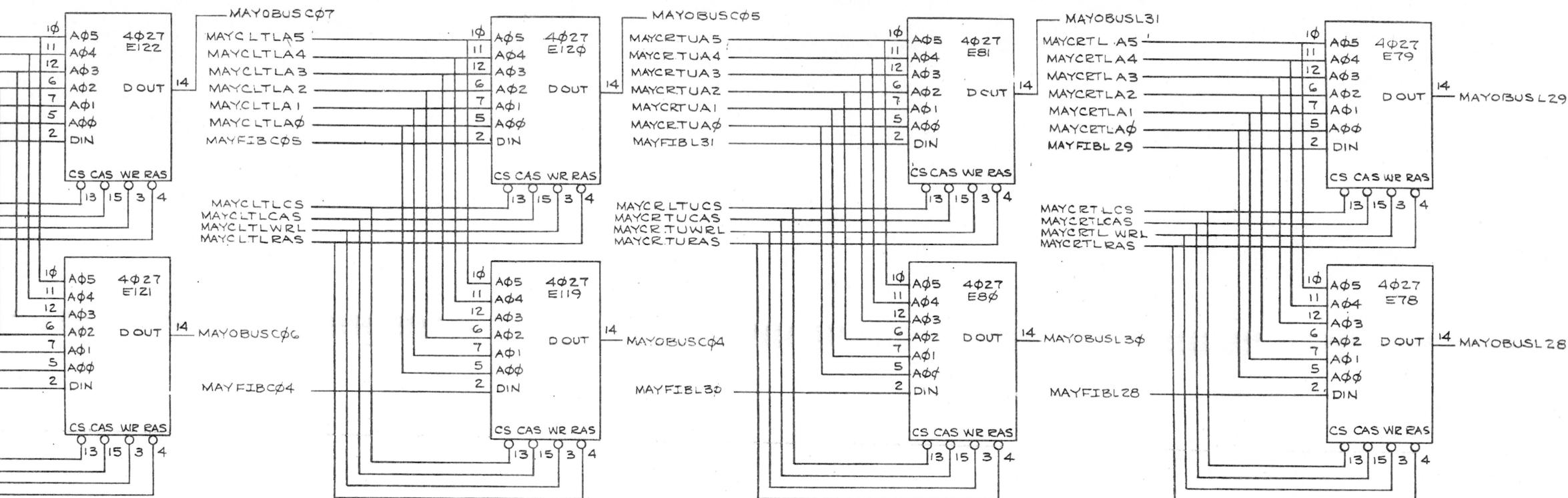
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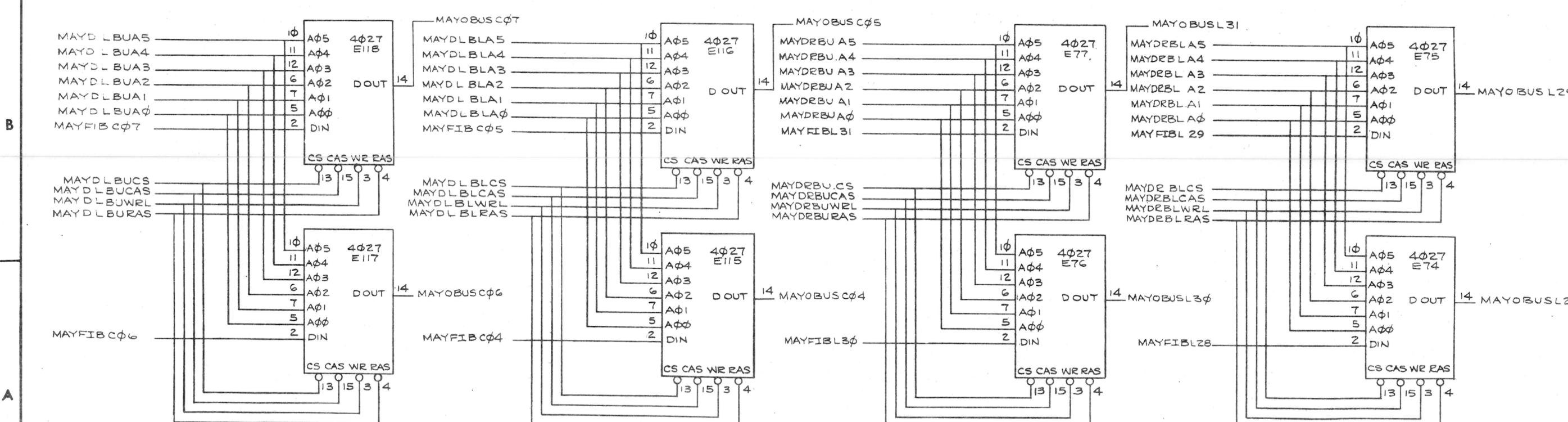
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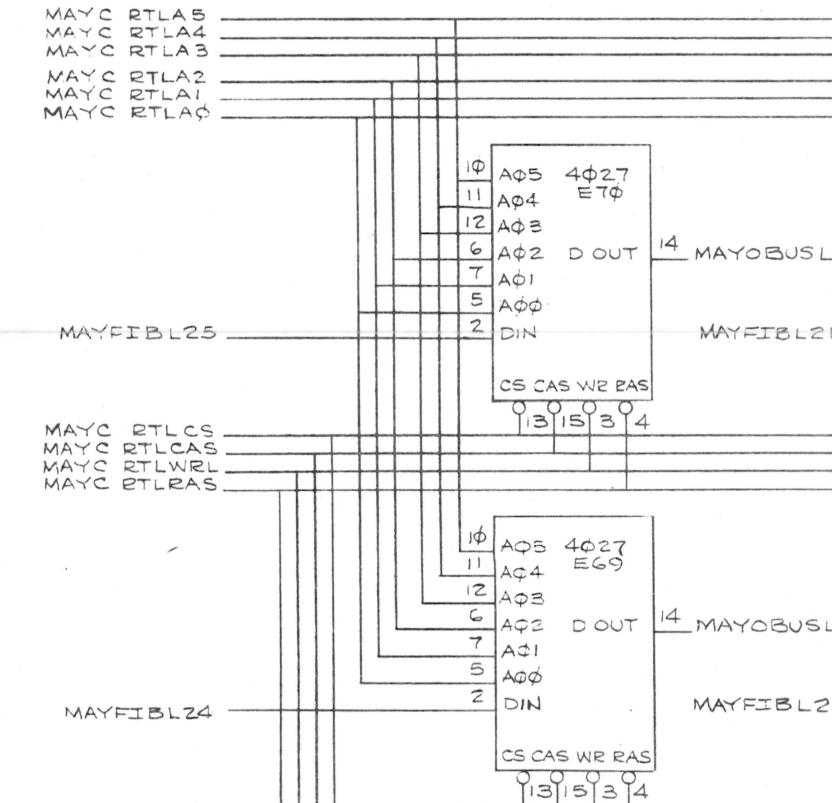
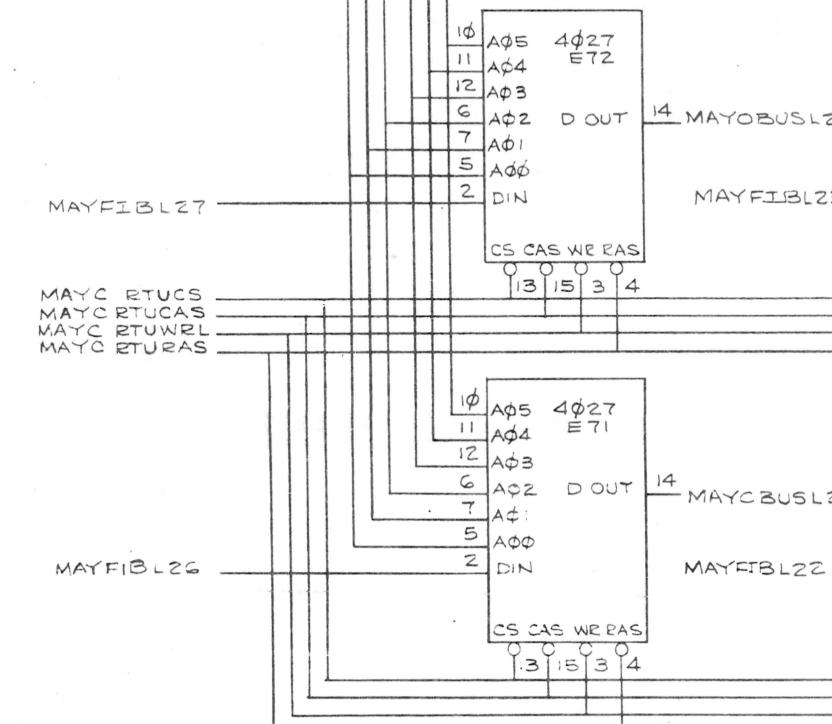
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MAYC RTUA3  
MAYC RTUA2  
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900 FORM NO. 900-120

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900 FORM NO. 900-120

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900 FORM NO. 900-120

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900 FORM NO. 900-120

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900 FORM NO. 900-120

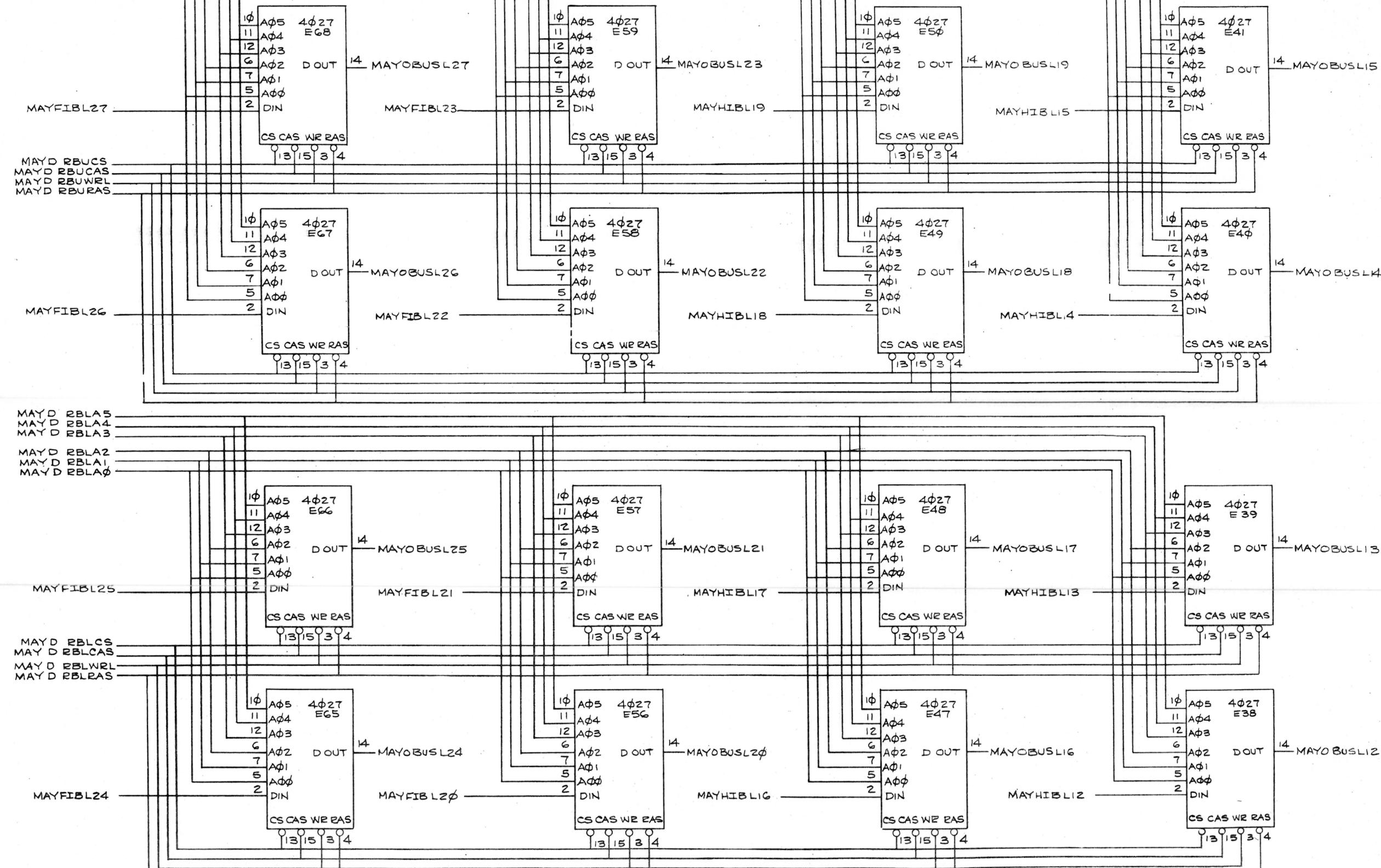
8 7 6 5 4 3 2 1

900 FORM NO. 900-120

8 7 6 5 4 3

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MAYD RBUA5  
MAYD RBUA4  
MAYD RBUA3  
MAYD RBUA2  
MAYD RBUA1  
MAYD RBUA0



REVISIONS		
CHK	CHANGE NO.	REV.

TITLE STAR MOS MEMORY  
(16 PIN DESIGN)(MAYR) SIZE CODE D CS M8211-0-1 REV. E  
SCALE SHEET 14 OF 17 DIST. TW  
000 FORM NO. 8

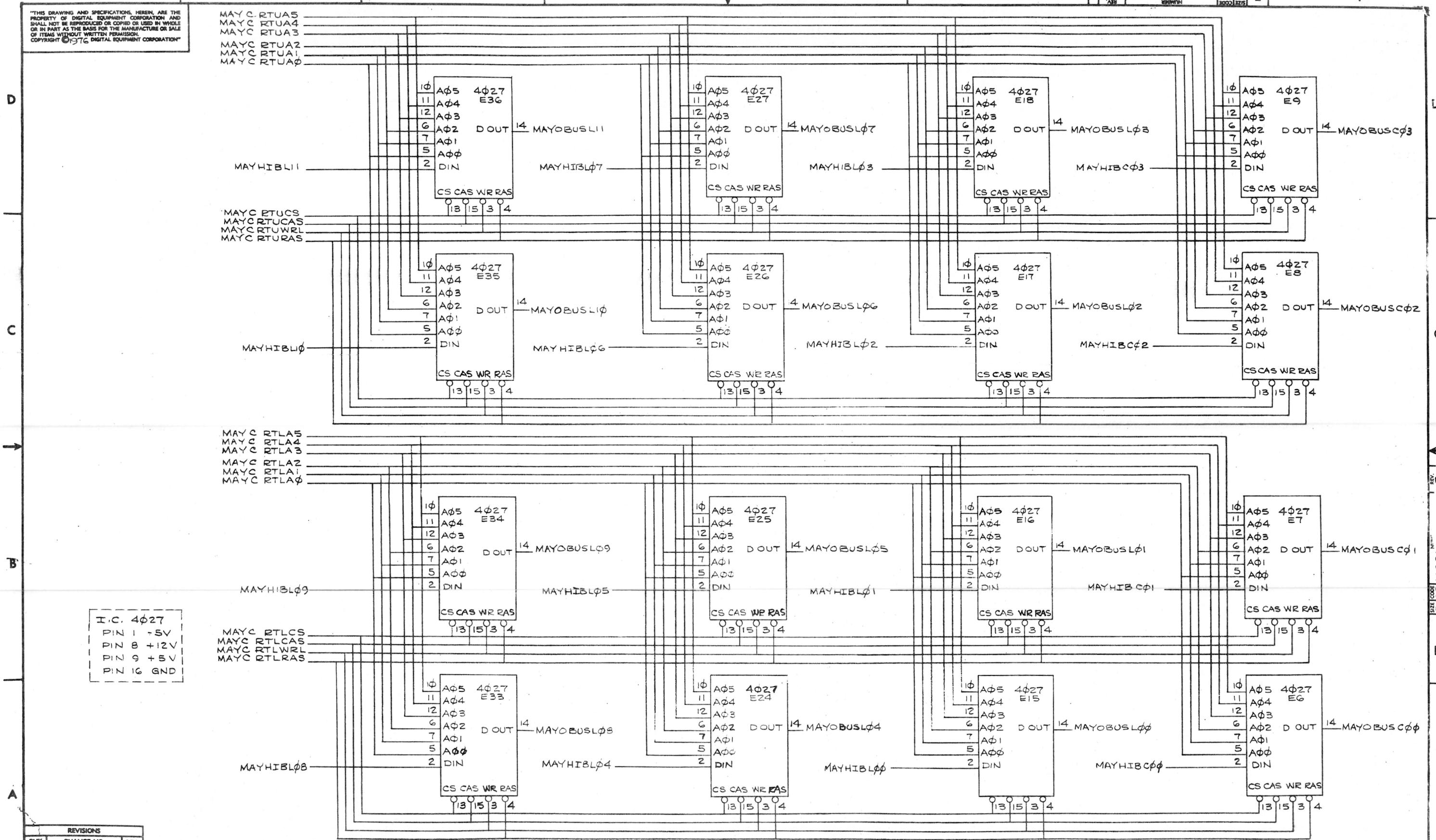
REV. E  
SIZE CODE M8211-0-1  
C  
B  
A

B

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1

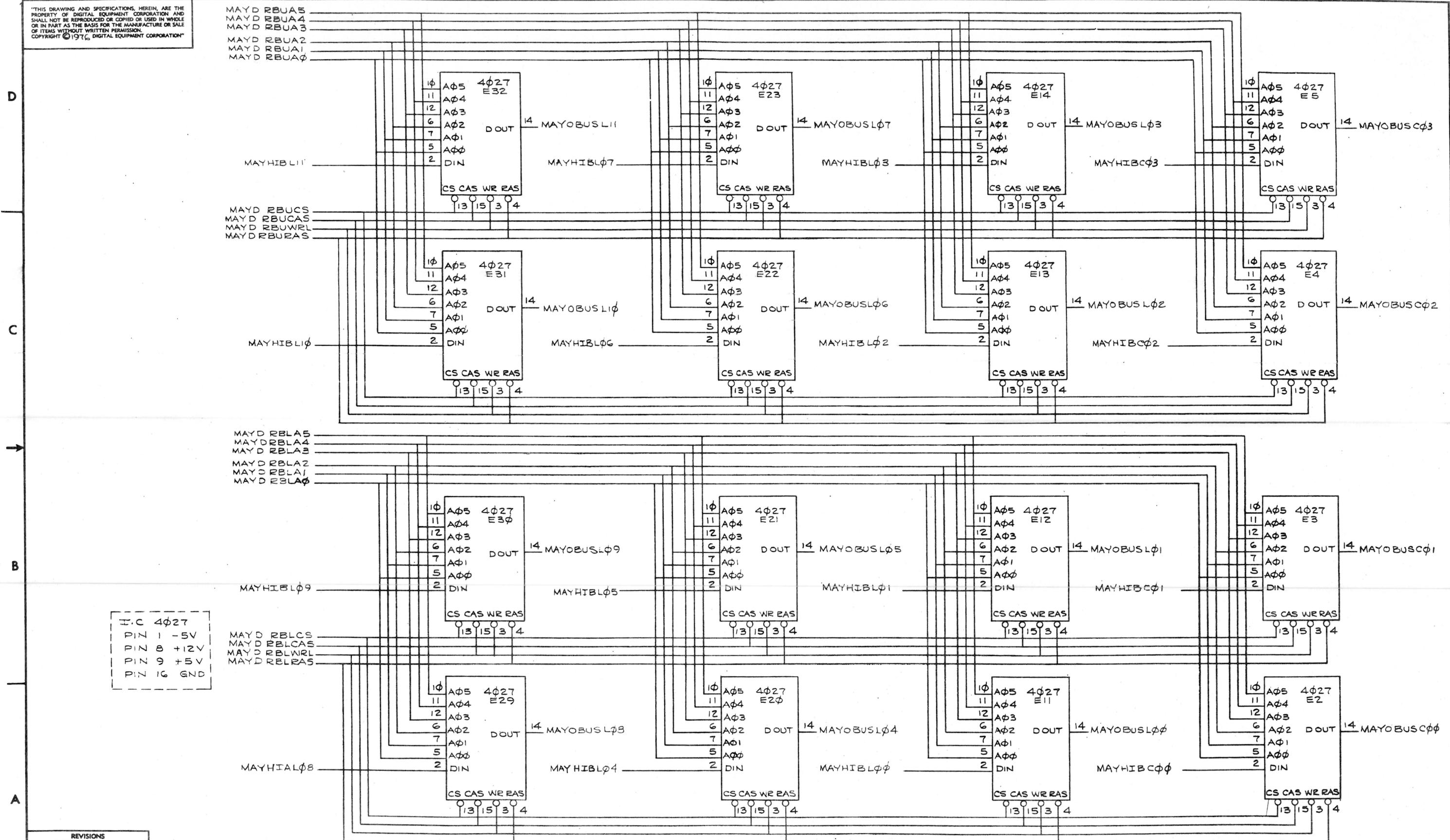
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REVISIONS		
CHK	CHANGE NO.	REV.

TITLE		STAR MOS MEMORY (16 PIN DESIGN)(MAYS)	SIZE CODE	NUMBER	REV.
SCALE	1/16	SHEET 15 OF 17	DIST.		

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REVISIONS		
CHK	CHANGE NO.	REV.

SHEET **1** OF **1**

**TITLE** STAR-MOS MEMORY  
(16 PIN DESIGN) (MAY T)

SIZE CODE NUMBER  
D CSM 8211-Ø-1

REV.  
E

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8 7 6 5 4 3 2 1

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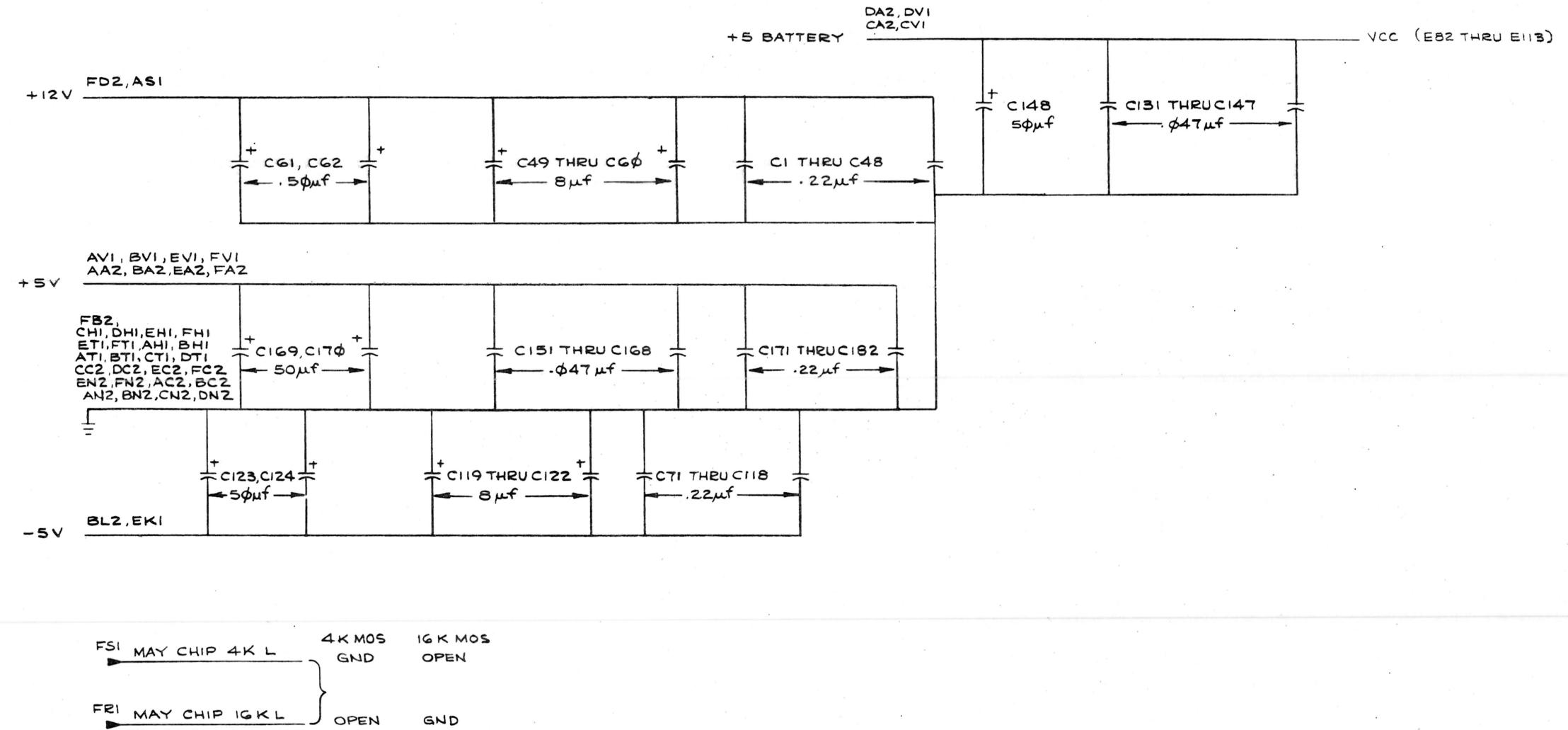
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SLN. P/N:

REVISIONS		
CHK	CHANGE NO.	REV.

DEC FORM NO. 80-120

TITLE STAR MOS MEMORY  
(16 PIN DESIGN) SIZE CODE DCS M8211-0-1 NUMBER REV. E

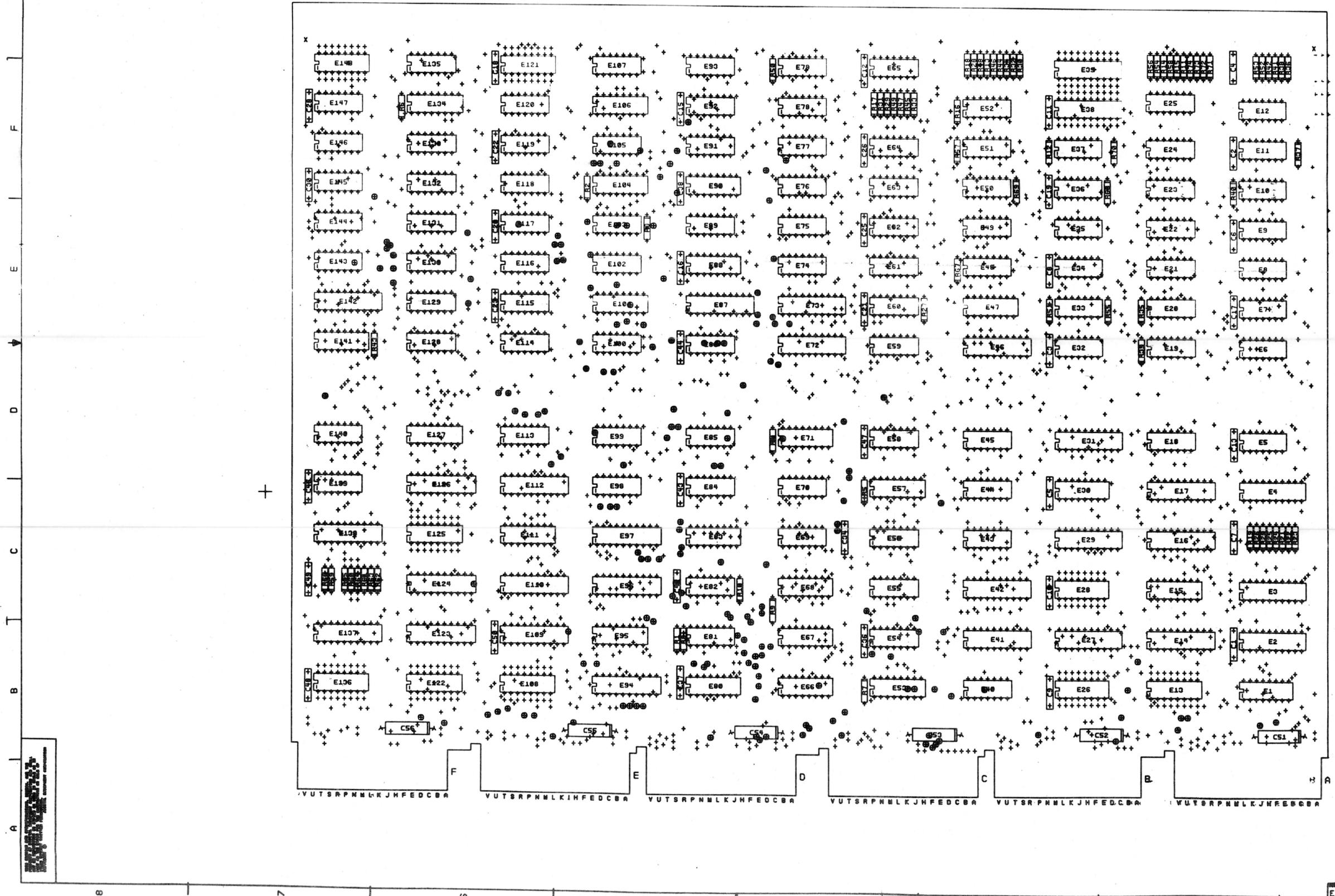
SCALE / / SHEET 17 OF 17 DIST.

digital  
TITLE: MEMORY DATA BOARD  
NUMBER: E U A M 6212-0-0  
DATE: 5-27-77  
DRAWN BY: J. D. Johnson  
CHK'D BY: J. D. Johnson  
PROJ. ENGR: J. D. Johnson  
PROD. ENGR: J. D. Johnson  
SHEET NO. 1 OF 3  
SIZE/CODE: 22-27  
SCALE: 1:1  
NEXT HIGHER REV: B-DO-M6212-0-0

PRINTED BY: R. R. CO.  
ON: 5-27-77  
FOR: M6212-0-0  
BY: J. D. Johnson  
CHECKED: J. D. Johnson  
REVIEWED: J. D. Johnson  
APPROVED: J. D. Johnson  
P. R. CO.

NOTES:  
E U A M 6212-0-0 C

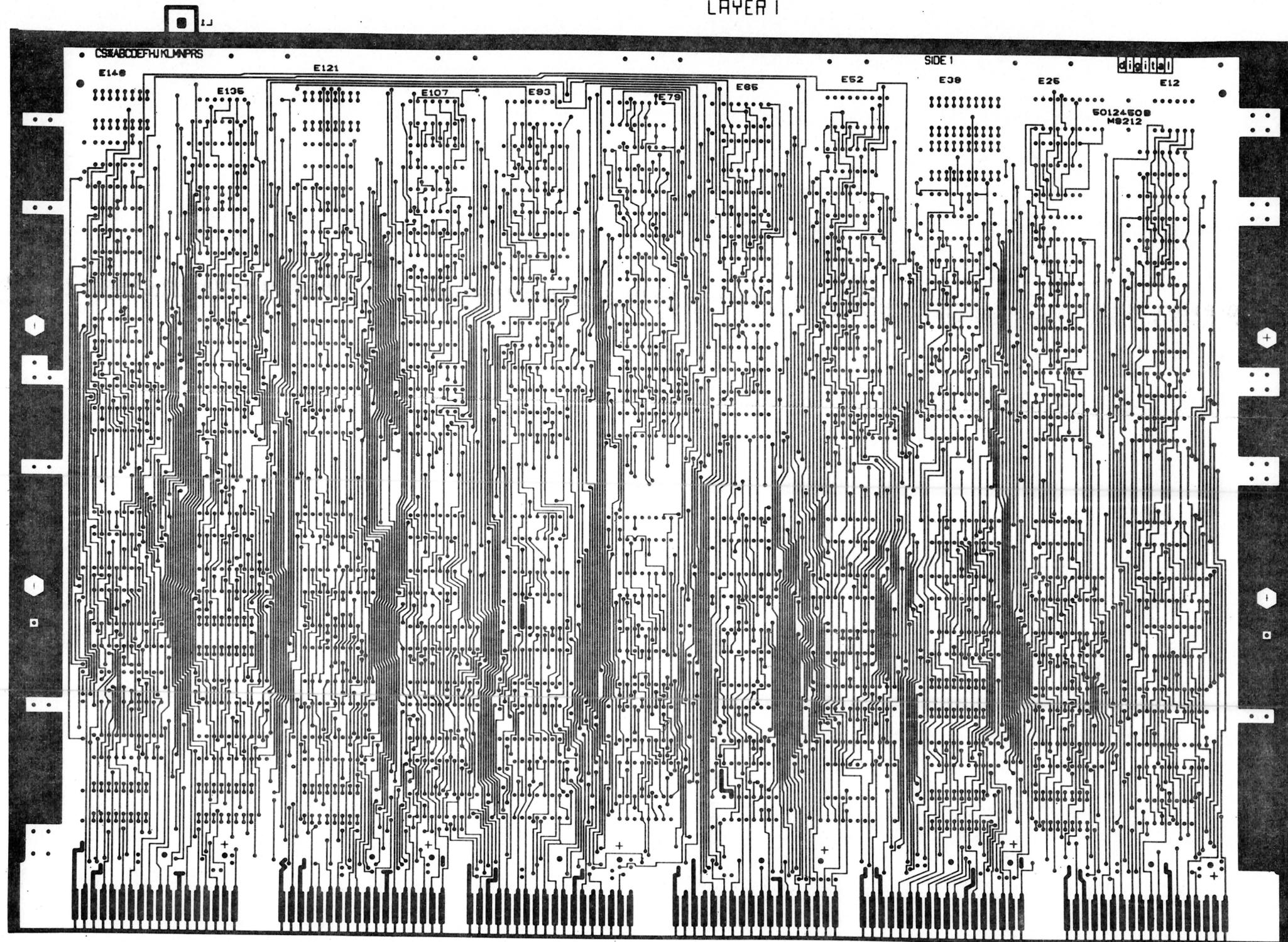
COMPONENT SIDE VIEW



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8 7 6 5 4 3 2 1

LAYER 1



REVISIONS		
CHK	CHANGE NO.	REV.

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TITLE - MEMORY DATA BOARD SIZECODE E UA NUMBER M8212-0-0 REV. C  
SCALE 2-1 SHEET 2 OF 3 DIST. 1 TW

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REV. A

REVISIONS		
CHG.	CHANGE NO.	REV.
DRAWING NO. 6012450B M8212		
DATE 10-10-77		

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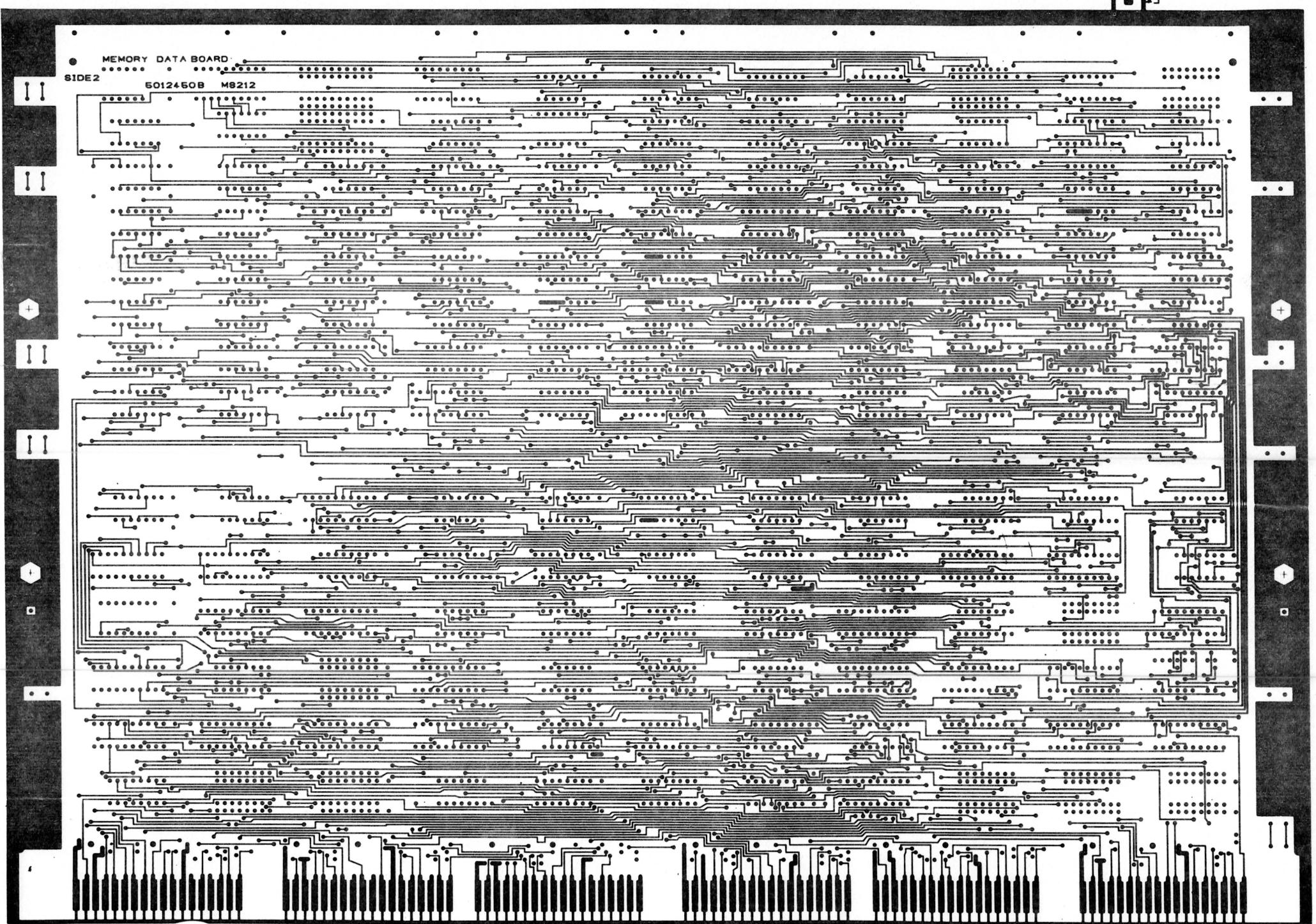
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H A3YAJ



TITLE MEMORY DATA BOARD			REVISIONS	NUMBER M8212-0-0	REV. C
SCALE 2-1	SHEET 3 OF 3	DIST. 1	EUA	CODE	

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**DIGITAL EQUIPMENT CORPORATION  
PARTS LIST**

MADE BY	L. REYNOLDS	CHECKED <i>L. Gammareo</i>	SECTION
DATE	OCT 3 77	DATE	7-22-77
ENG	<i>J.S. Durvasula</i>	PROD <i>Mike Terella</i>	ISSUED SECTION
DATE	7-28-77	DATE	8-2-77

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY / VARIATION		NOTES:	REF DESIGNATION
				M8212	M8212-YA		
1	D-MD-5012450-0-0	5012450	ETCH BOARD	1	1		
2		10-12784	CAPACITOR, .047 UF 50 V	38	38		C1-C13,C15-C23,C25,C26,C28,C30,C34, C36-C38,C42-C44,C46-C50
3		10-12084-01	CAPACITOR, 8 UF 25 V	6	6		C51-C56
4		13-00365	RESISTOR, 1K,1/4W.5%	73	73		R2-R74
5		19-11573	I.C. DEC 74S280	29	29		E7,E9,E11,E12,E20,E24,E25,E34,E37,E48, E51,E52,E61,E62,E63,E65,E74-E79,E100, E115,E130,E132,E143,E145,E10
6		1913493	I.C. DEC 74S241	2	2		E72,E73
7		1913340	I.C. DEC 74S32	1	1		E55
8		19-12389	I.C. DEC 74S08	5	5		E54,E64,E86,E102,E105
9		19-10534	I.C. DEC 74S04	5	5		E59,E70,E91,E116,E147
10							
11		19-11675	I.C. DEC 74S138	3	3		E90,E106,E134
12		19-11983	I.C. DEC 74S133	1	1		E68
13		19-10532	I.C. DEC 74S00	4	4		E40,E43,E84,E107
14		19-10549	I.C. DEC 74S158	4	4		E53,E83,E88,E101
15		19-10957	I.C. DEC 74S175	2	2		E66,E67
16		19-12746	I.C. DEC 74S37	1	1		E82
17		19-12388	I.C. DEC 74S02	2	2		E92,E120
18		19-10545	I.C. DEC 74S112	1	1		E104

E.C.O. NO.	M8212-1 TW001	M8212-1 TW002	M8212-2 TW002
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TITLE  
MEMORY DATA BOARD

ASSY NO.  
E-UA-M8212-0-0

SHEET 1 OF 2

SIZE  
**B**

CODE  
**PL**

NUMBER  
M8212-0-0

REV.  
**C**

INSERTION PARTS LIST DATA BASE REV

**DIGITAL EQUIPMENT CORPORATION  
PARTS LIST**

MADE BY L. REYNOLDS  
DATE OCT 3 77

CHECKED *L. Giannarino* SECTION  
DATE 7-22-77

ENG *A. Durwasha*  
DATE 7-28-77

PROD *Mike Tuller* ISSUED SECTION  
DATE 8-2-77

ITEM NO.	DRAWING NO.	PART NO.	DESCRIPTION	QUANTITY / VARIATION								NOTES:	REF DESIGNATION	
				M8212	M8212-YA									
19		19-12855	I.C. DEC 74LS195	1	1								E71	
20		19-10537	I.C. DEC 74S11	4	4								E56, E58, E85, E103	
21		19-10539	I.C. DEC 74S20	2	2								E69, E93	
22		19-12833	I.C. DEC 74LS109	1	1								E57	
23		19-10533	I.C. DEC 74S03	1	0								E81	
24		19-11641	I.C. DEC 74S257	9	9								E1, E15, E30, E47, E80, E95, E111, E127, E141	
25		19-12805	I.C. DEC 74LS08	16	16								E8, E21, E22, E23, E35, E36, E49, E50, E89, E117, E118, E119, E131, E133, E144, E146	
26		19-12096	I.C. DEC 74S06	18	18								E5, E6, E18, E19, E32, E33, E44, E45, E60, E98, E9, E113, E114, E128, E129, E135, E139, E140	
27		19-13670-00	I.C. DEC 74S373	25	25								E2, E3, E4, E16, E17, E27, E29, E31, E41, E42, E46, E87, E94, E96, E97, E109, E110, E112, E123, E124, E126, E137, E138, E142, E14	
28		SPARES	I.C. DEC	11	11								E13, E26, E28, E39, E121, E125, E136, E148, E38, E108, E122	
29		12-10711-02	HANDLE ASSY	1	1									
30		90-00024-01	EYELETS	12	12									
31		13-01890	RESISTOR, 560Ω, 1/4W, 5%	1	1								R1	
32		19-15019	IC DEC 74S38	0	1								E81	

ECO. NO.  
E.C.E.

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DRB 125

TITLE

MEMORY DATA BOARD

ASSY NO.

E-UA-M8212-0-0

SIZE CODE

B PL

NUMBER

M8212-0-0

REV.

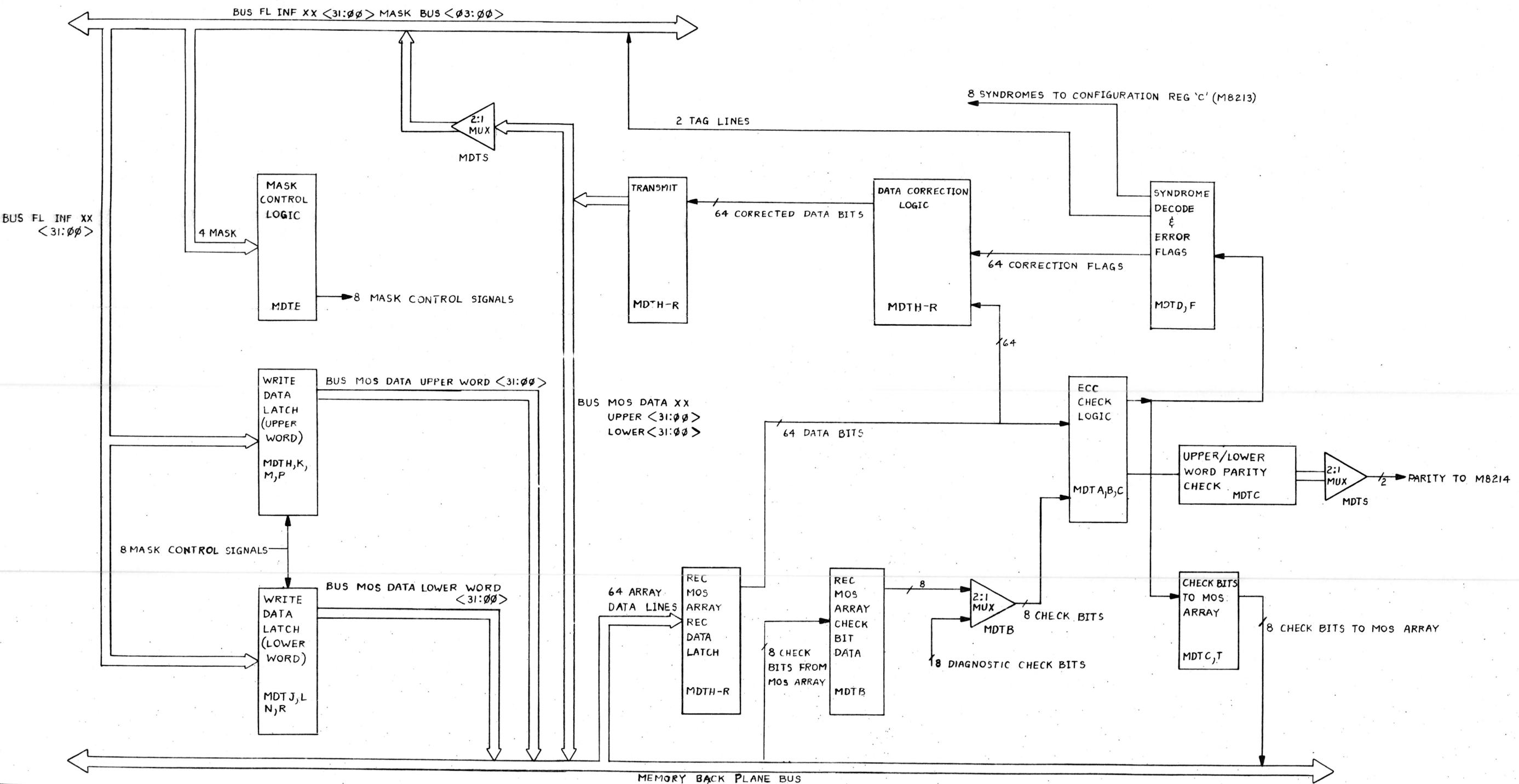
C

SHEET 2 OF 2

INSERTION PARTS LIST DATA BASE REV

TW

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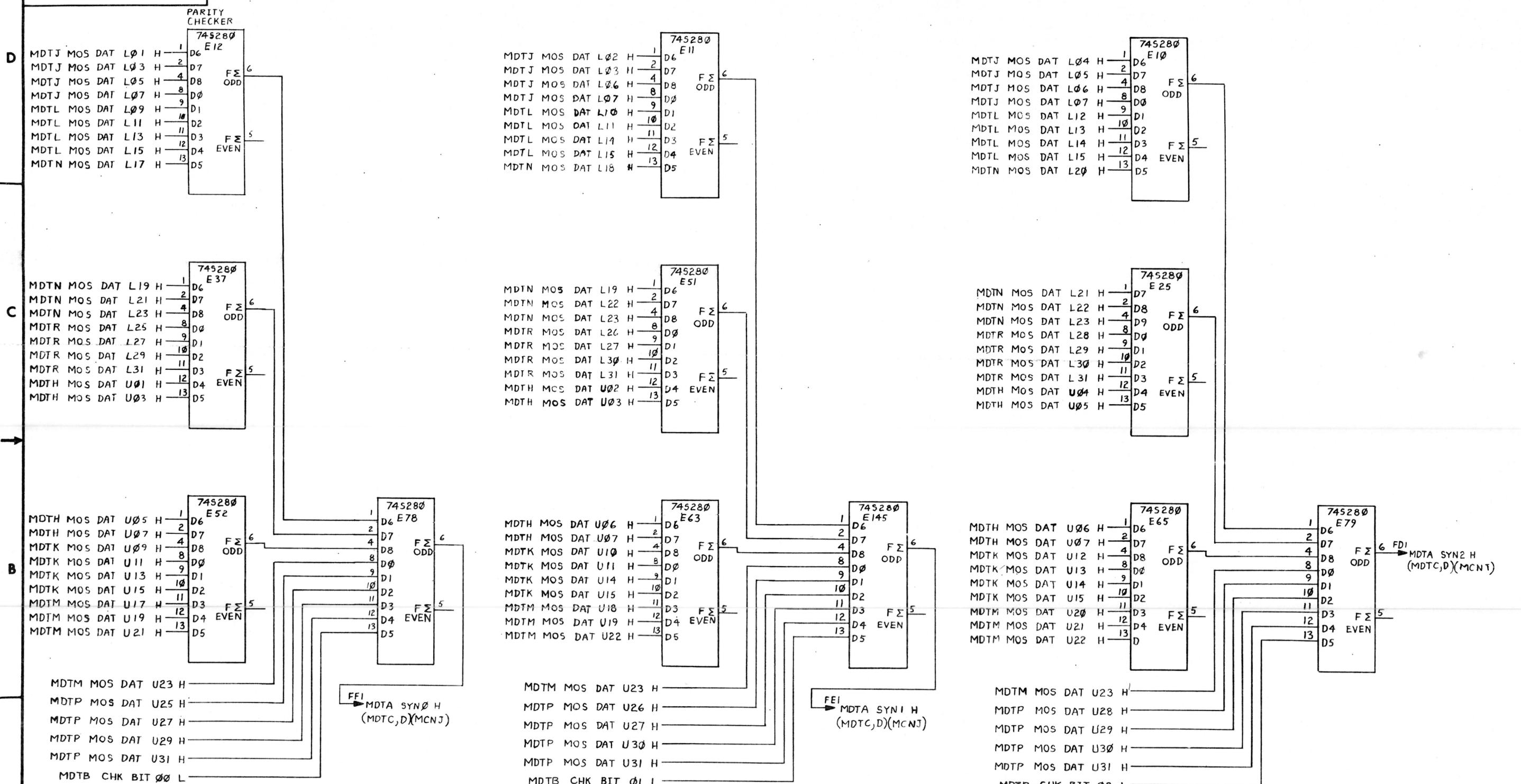


(BLOCK DIAGRAM )

(SLOT 18)

DRN. A FM	6/8/77	FIRST USED ON	digital
CHK'D	2-2-84	TITLE	
ENG.	7/26/77	MEMORY DATA BOARD	
PROJ. ENG.	7/26/77	(BLOCK DIAGRAM)	
PROD. Grant Lee	8/3/77		
NEXT HIGHER ASSY.			
SCALE	11	SIZE	CODE
SHEET	1 OF 19	D	NUMBER
		CS	M8212-0-1
		DIST.	REV.
			C

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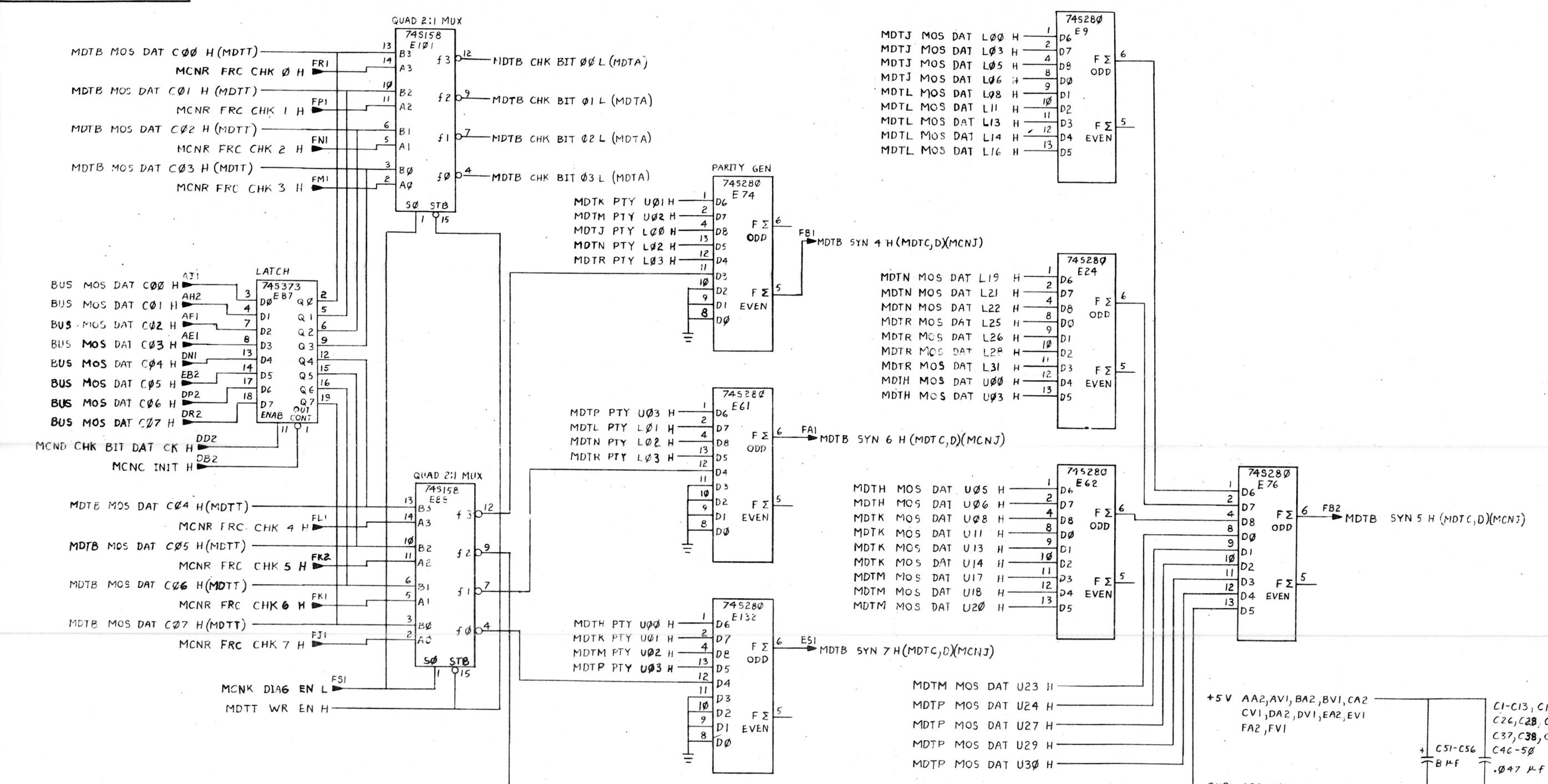


(SYNDROME CHECK &amp; CHECK BIT ENCODE) (SLOT 18)

REVISIONS		
CHK	CHANGE NO.	REV.

TITLE	SIZE CODE	NUMBER
MEMORY DATA BOARD (MDTA)	D	CS M8212-0-1
SCALE	1/1	SHEET 2 OF 19 DIST.

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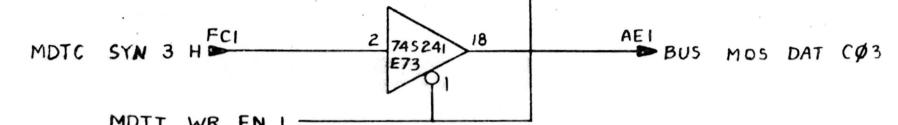
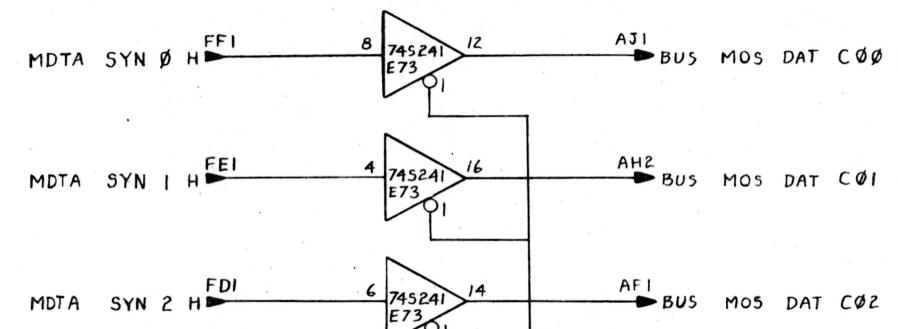


(SYNDROME CHECK & CHECK BIT ENCODE) (SLOT 18)  
 TITLE: MEMORY DATA BOARD (MDTB) SIZE CODE: D  
 DCS M8212-0-1 NUMBER: REV. C

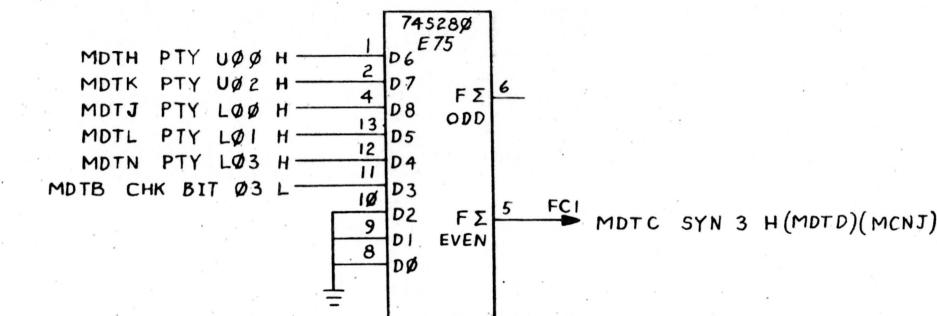
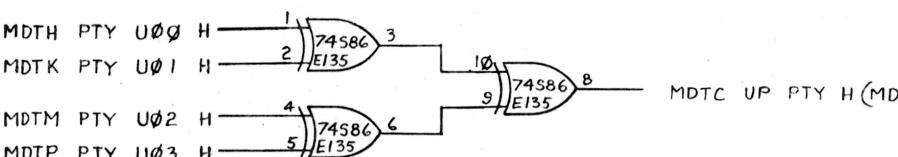
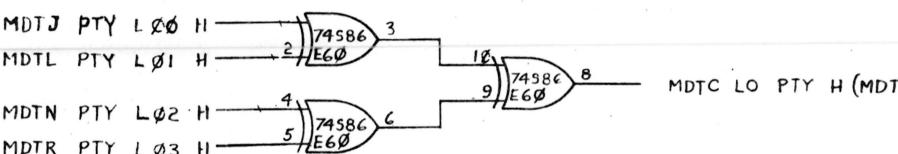
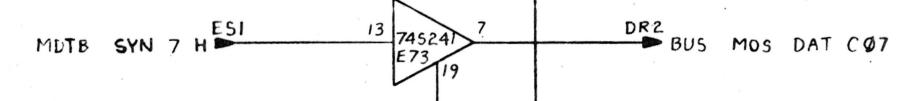
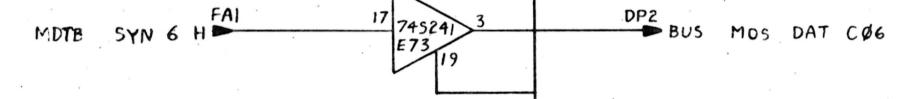
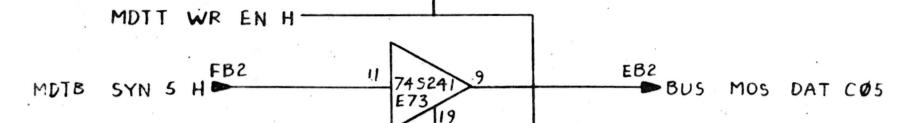
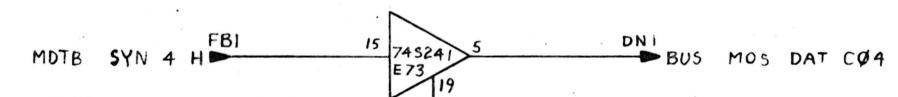
SCALE: 11 SHEET 3 OF 19 DIST.:

REVISIONS		
CHK.	CHANGE NO.	REV.
HARDWARE PLS. REF.		

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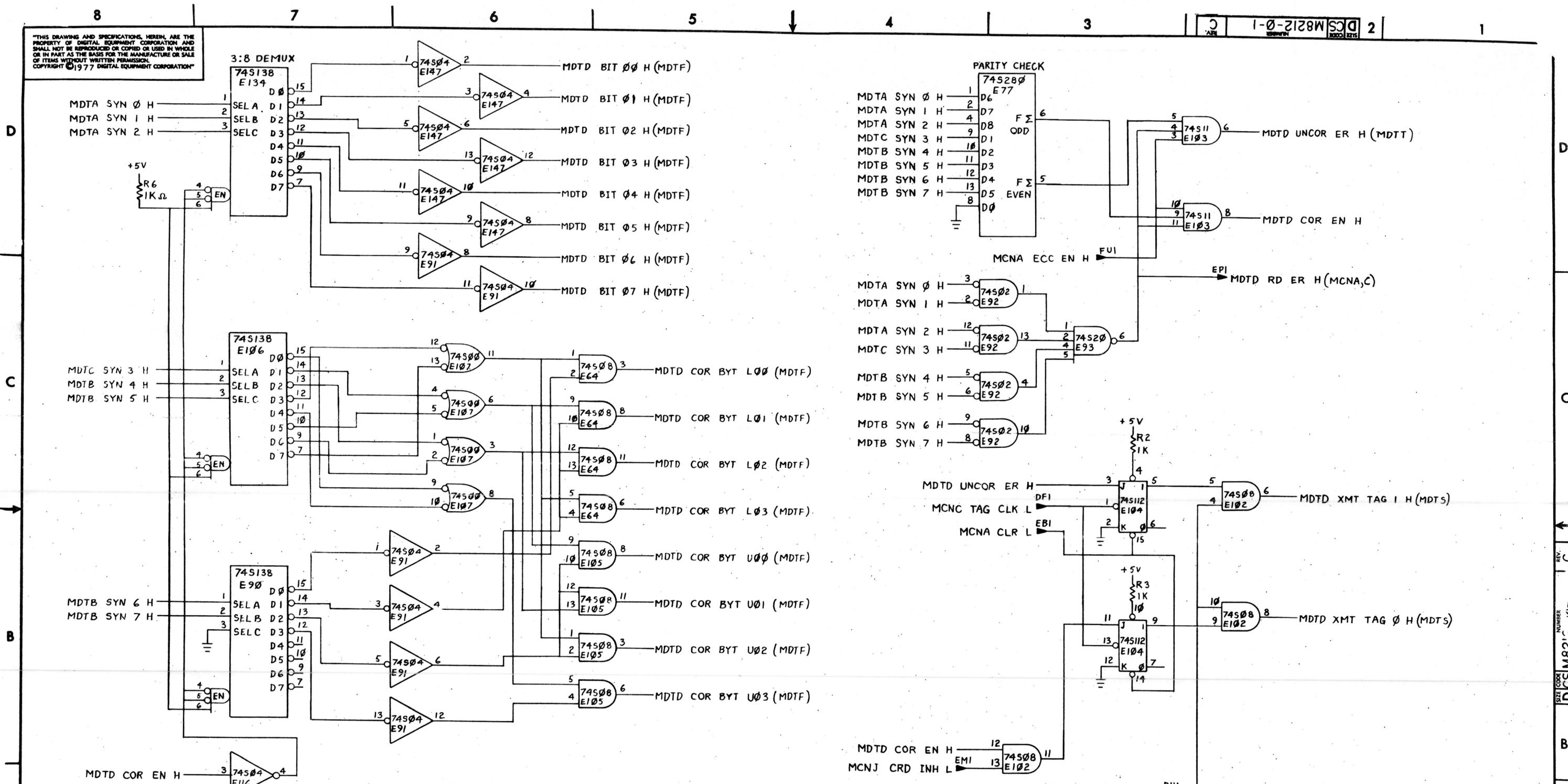
MDTT WR EN L



REVISIONS		
CHK	CHANGE NO.	REV.

(DATA PARITY ENCODER, CHECK BIT REWRITE BUFFER &  
SYNDROME 3 CHECK)  
(SLOT 18)

TITLE	SIZE/CODE	NUMBER	REV.
MEMORY DATA BOARD (MDTC)	DCS	M8212-0-1	C
SCALE	1/1	SHEET 4 OF 19	DIST.

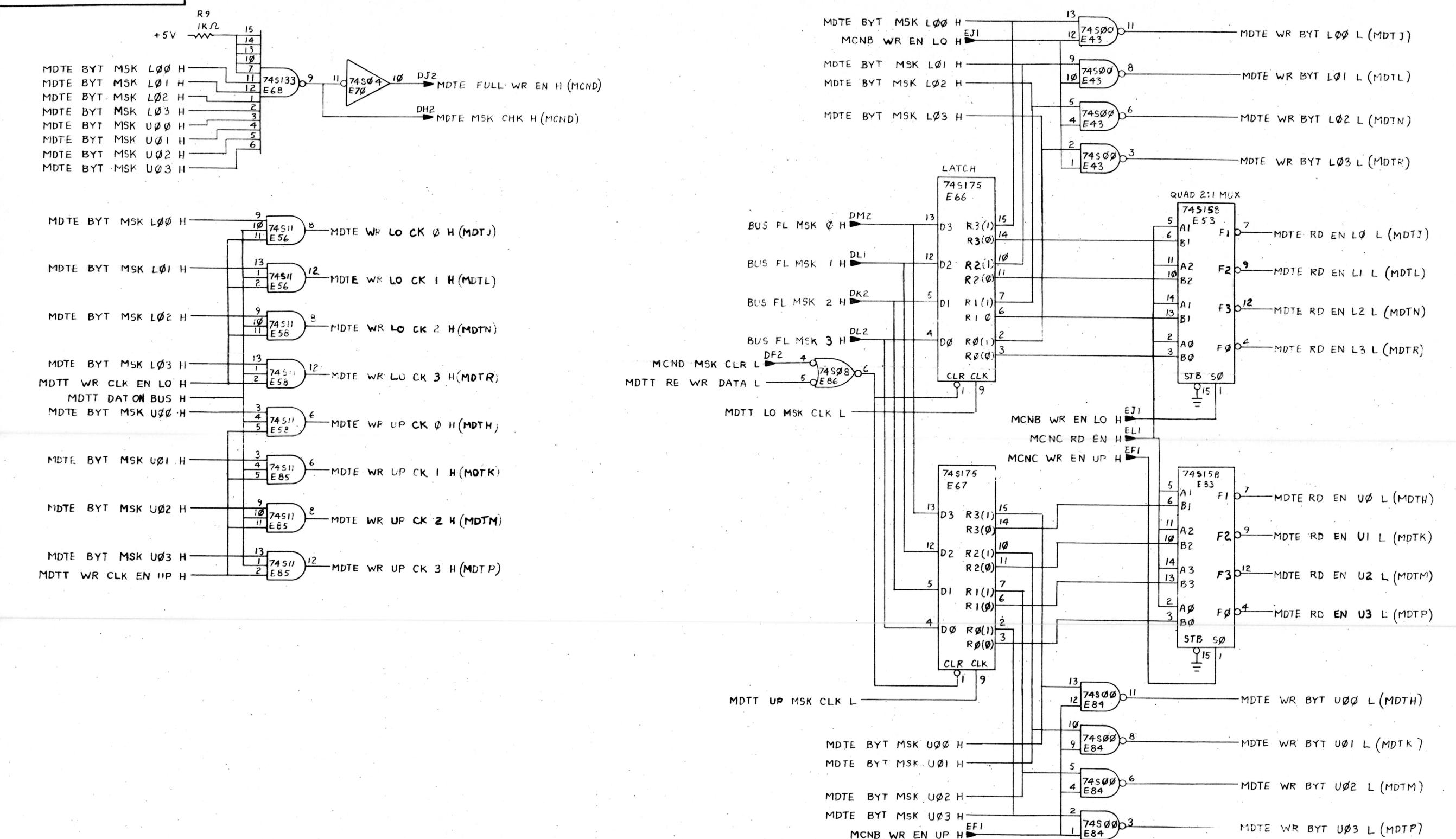


REVISIONS		
CHK	CHANGE NO.	REV.

(ERROR DETECT & TAG GENERATION) (SLOT 18)

TITLE <b>MEMORY DATA BOARD (MDTD)</b>	SIZE CODE <b>D CS</b>	NUMBER <b>M8212-0-1</b>	REV. <b>C</b>
SCALE <b>1/4</b>	SHEET <b>6 OF 10</b>	DATE <b>10-10-80</b>	

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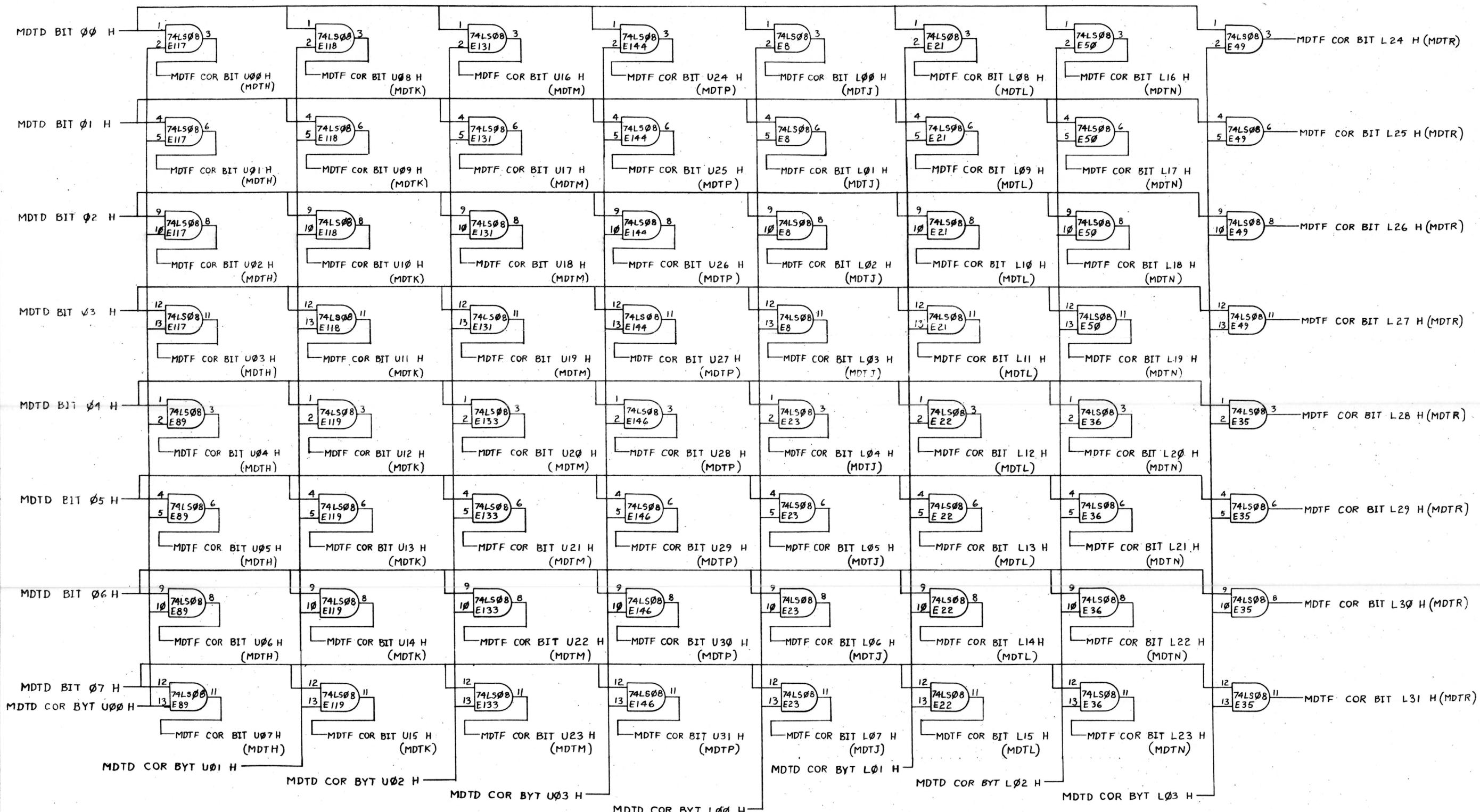
REVISIONS		
CHK	CHANGE NO.	REV

## (BYTE CONTROL)

(SLOT 18)

TITLE <b>MEMORY DATA BOARD (MDTE)</b>	SIZE <b>D</b>	CODE <b>CS</b>	NUMBER <b>M8212-Ø-1</b>	REV. <b>C</b>
SCALE — / —	SHEET <b>6</b>	OF <b>19</b>	DIST.	

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REVISIONS		
CHK	CHANGE NO.	REV.

(BIT CORRECTION FLAGS)			(SLOT 18)		
TITLE	SIZE CODE	NUMBER	TITLE	SIZE CODE	NUMBER
MEMORY DATA BOARD (MDTF)	D CS	M8212-0-1	MEMORY DATA BOARD (MDTF)	D CS	M8212-0-1

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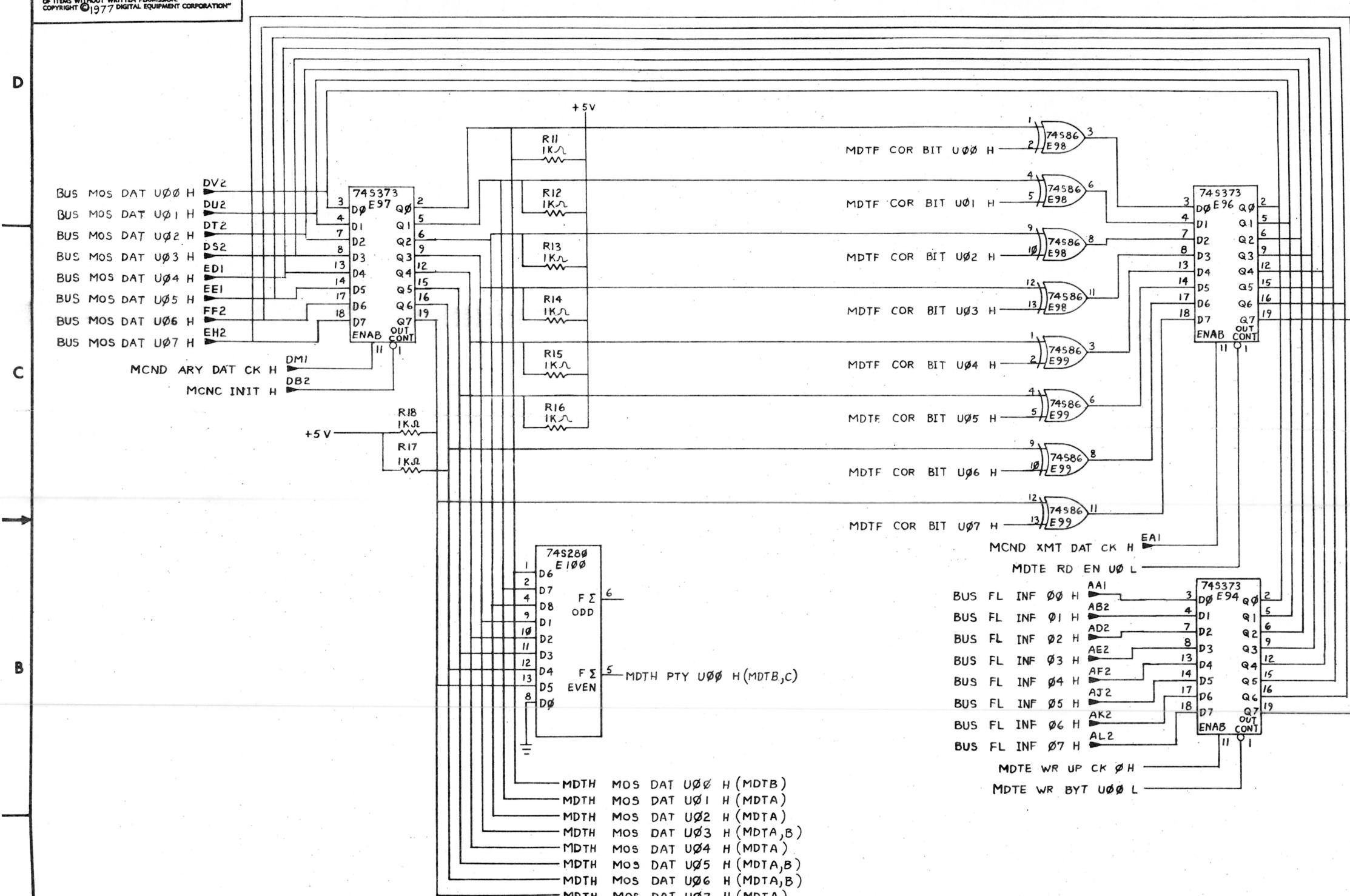
3

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2 DCS M8212-0-1

C

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REVISIONS		
CHK	CHANGE NO.	REV.

DDG FORM NO. 800-100

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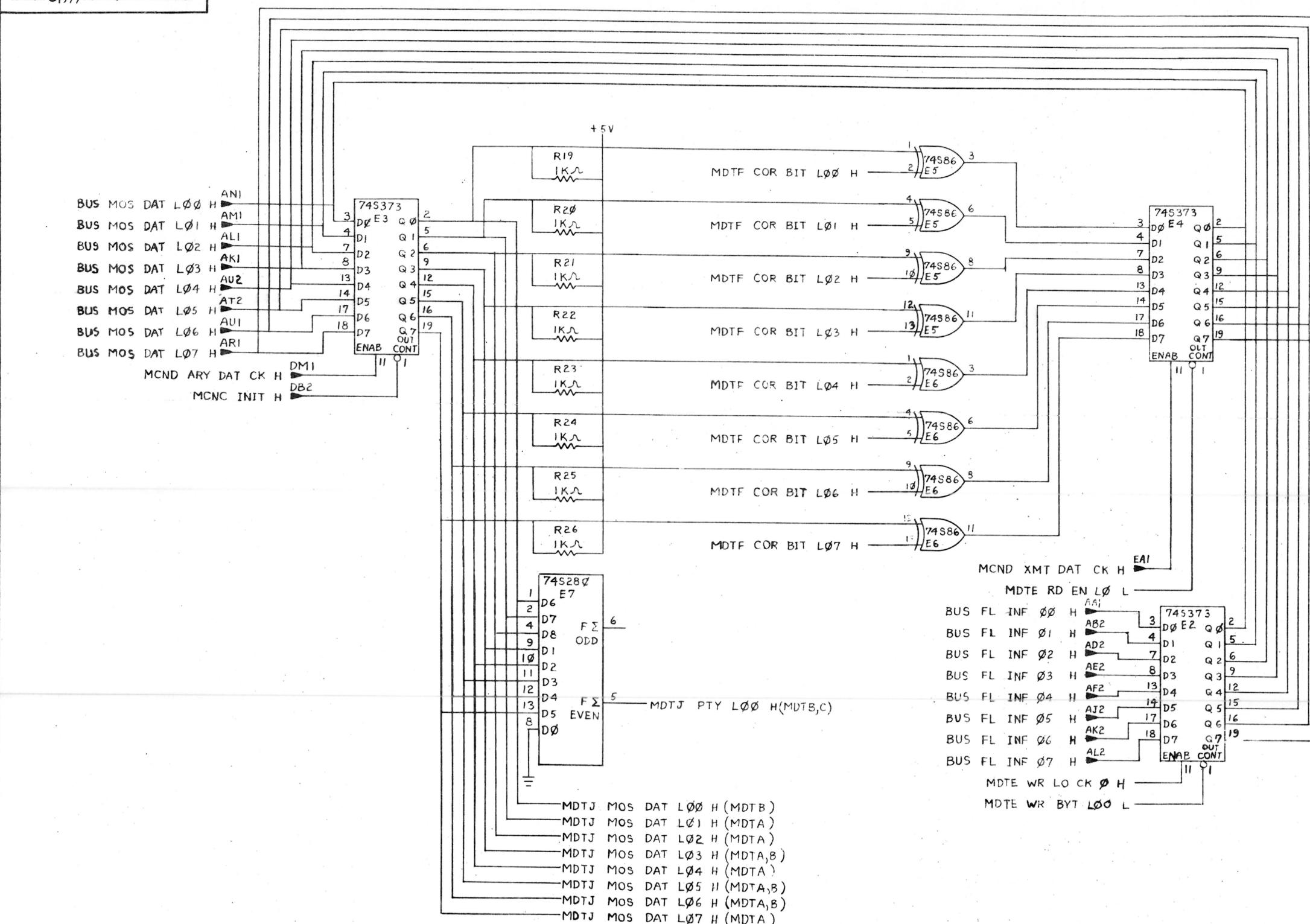
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(DATA RECEIVE &amp; XMIT LATCHES)

(SLOT 18)

TITLE: MEMORY DATA BOARD (MDTH)  
 SIZE CODE: D CS NUMBER: M8212-0-1 REV: C  
 SCALE: 1/1 SHEET 8 OF 19 DIST:

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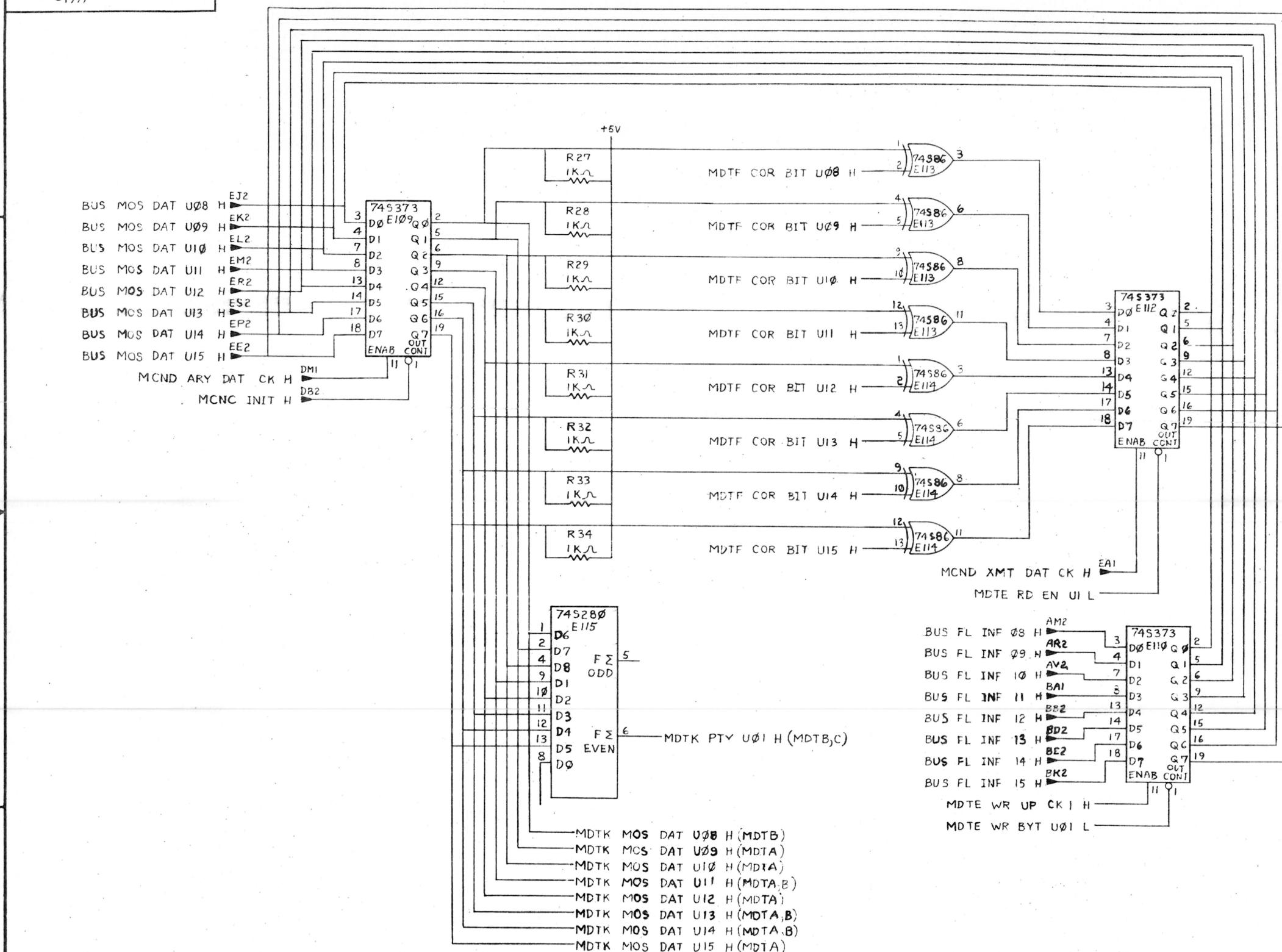
(DATA RECEIVE &amp; XMIT LATCHES)

(SLOT 18)

REVISIONS			TITLE			SIZE CODE			NUMBER		
CHK	CHANGE NO.	REV.	MEMORY DATA BOARD (MDTJ)			D			CS M8212-0-1		

SCALE 1/1 SHEET 9 OF 19 DIST. TW 1

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REVISIONS		
CHK	CHANGE NO.	REV.

(DATA RECEIVE &amp; XMIT LATCHES)

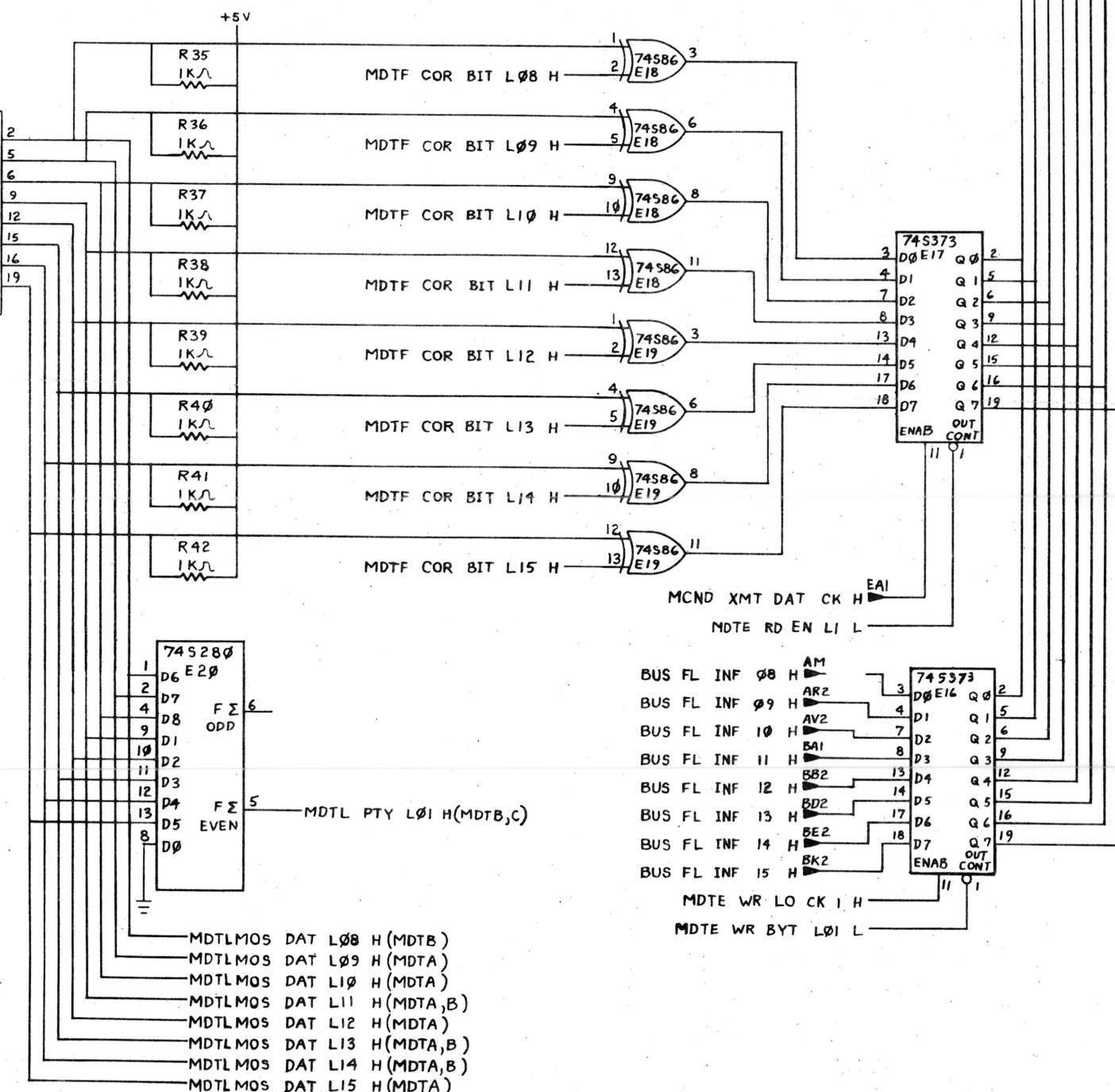
(SLOT 18)

TITLE	MEMORY DATA BOARD (MDTK)	SIZE CODE	NUMBER
D	DCS M8212-0-1	C	REV. C
SCALE	H	HEET	10 OF 19
DIST.			

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8 7 6 5 4 3 2 DCS M8212-0-1 C 1

BUS MOS DAT L08 H  
BUS MOS DAT L09 H  
BUS MOS DAT L10 H  
BUS MOS DAT L11 H  
BUS MOS DAT L12 H  
BUS MOS DAT L13 H  
BUS MOS DAT L14 H  
BUS MOS DAT L15 H  
MCND ARY DAT CK H  
MCNC INIT H



REVISIONS		
CHK	CHANGE NO.	REV.

(DATA RECEIVE & XMIT LATCHES) (SLOT 18)  
TITLE: MEMORY DATA BOARD (MDTL)  
SIZE/CODE: DCS M8212-0-1  
NUMBER: REV. C  
SCALE: 11 SHEET 11 OF 19 DIST. 1 TW 1

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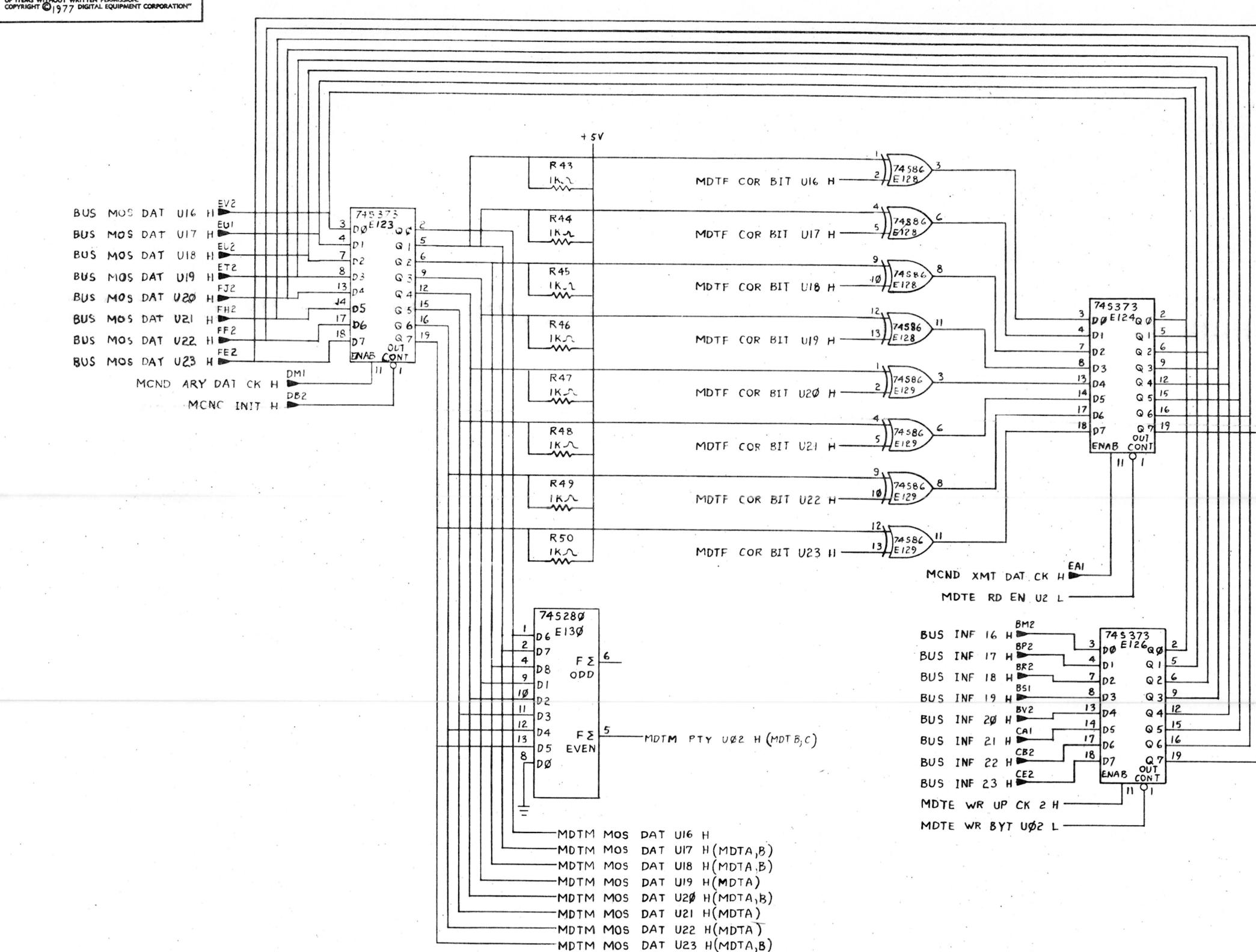
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REVISIONS		
CHK	CHANGE NO.	REV.

DRAFT P/N 0-1000

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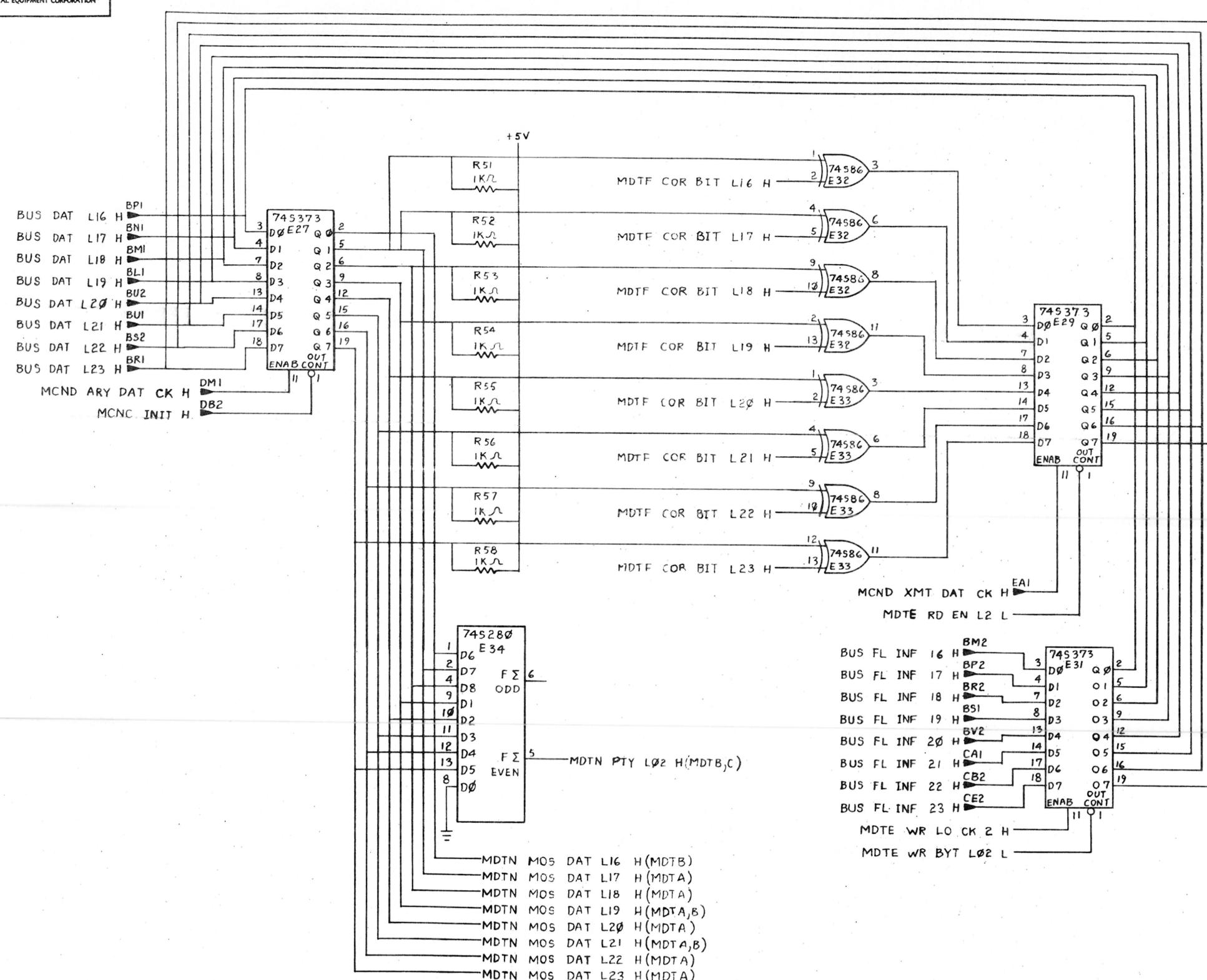
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(DATA RECEIVE &amp; XMIT LATCHES)

(SLOT 18)

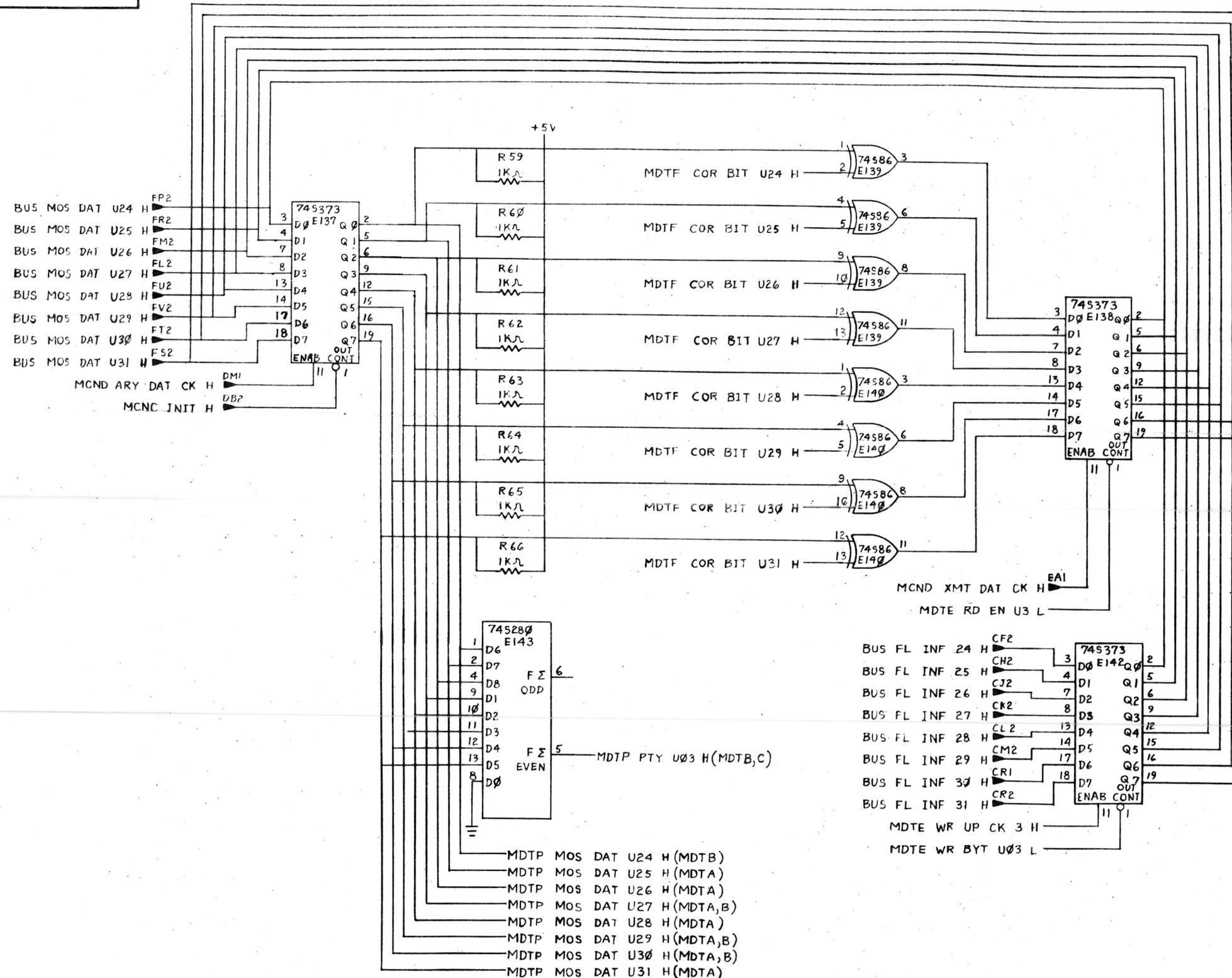
TITLE	MEMORY DATA BOARD (MDTM)	SIZE CODE	NUMBER
D	CS	M8212-0-1	REV.
SCALE	1/1	SHEET	12 OF 19
DIST.			

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REVISIONS		
CHK	CHANGE NO.	REV.

TITLE		SIZE	CODE	NUMBER	REV.
MEMORY DATA BOARD (MDTN)		D	CS	M8212-0-1	C
SCALE	H	SHEET	13	OF 19	DIST.



(DATA RECEIVE & XMIT LATCHES)

(SLOT 18)

TITLE <b>MEMORY DATA BOARD (MDTP)</b>	SIZE CODE <b>D CS</b>	NUMBER <b>M8212-0-1</b>	REV. <b>C</b>
SCALE <b>11</b>	SHEET <b>14</b> OF <b>19</b>	DIST.	

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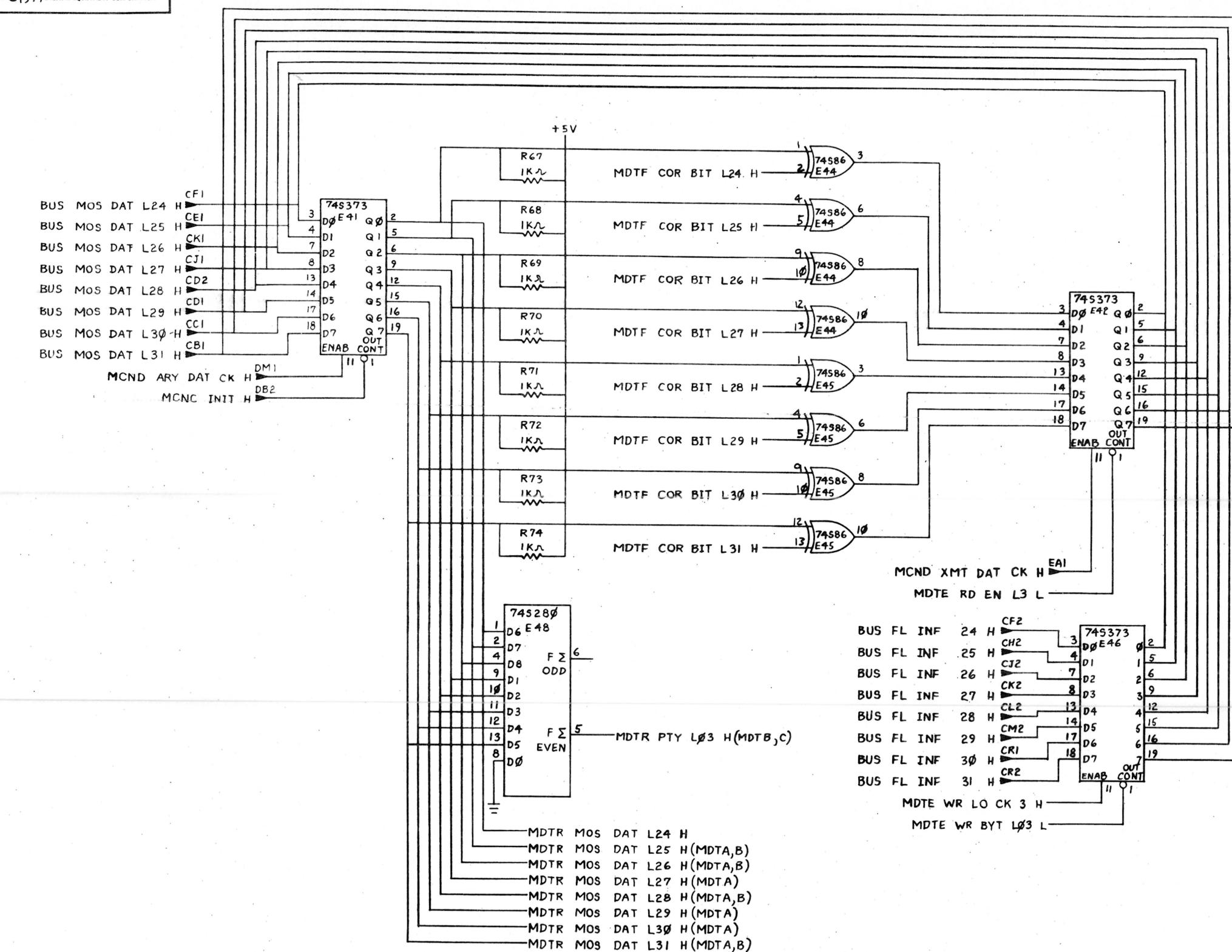
3

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D



REVISIONS		
CHK.	CHANGE NO.	REV.

(DATA RECEIVE &amp; XMIT LATCHES)

(SLOT 18)

TITLE  
MEMORY DATA BOARD (MDTR)

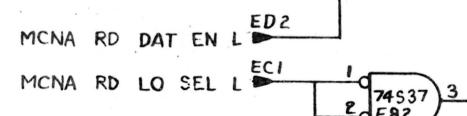
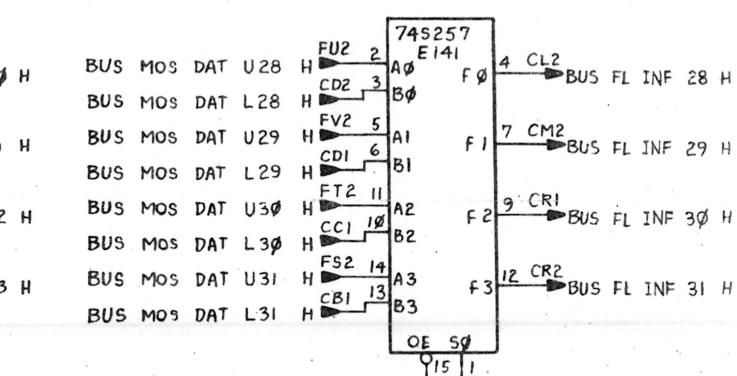
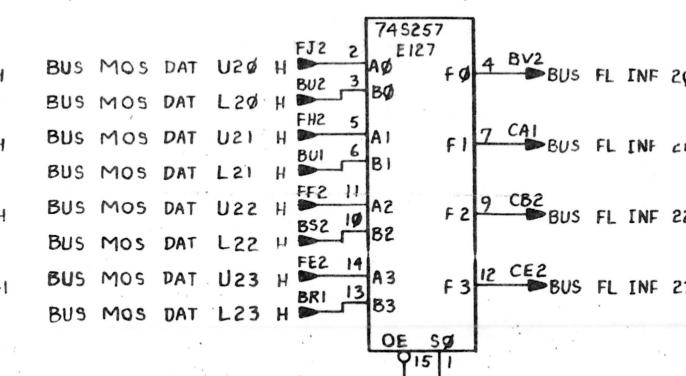
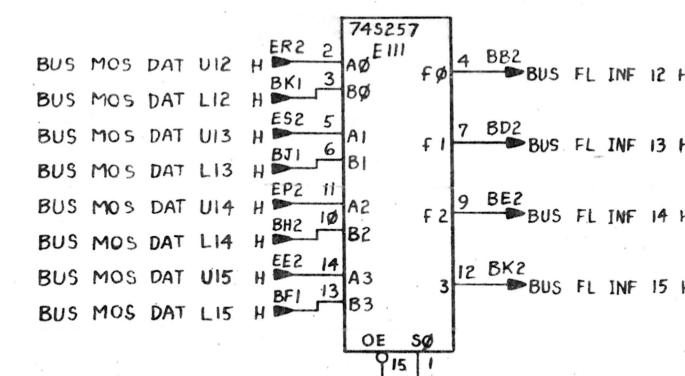
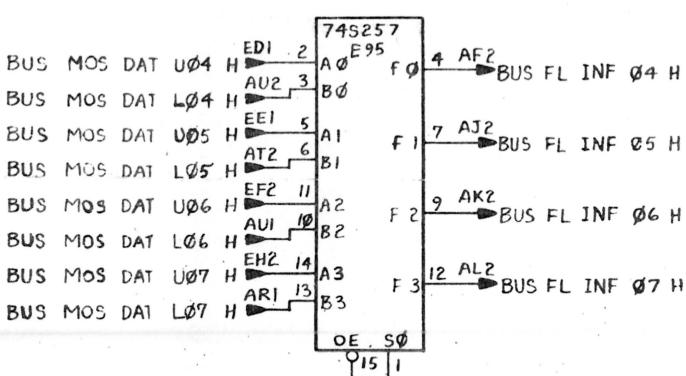
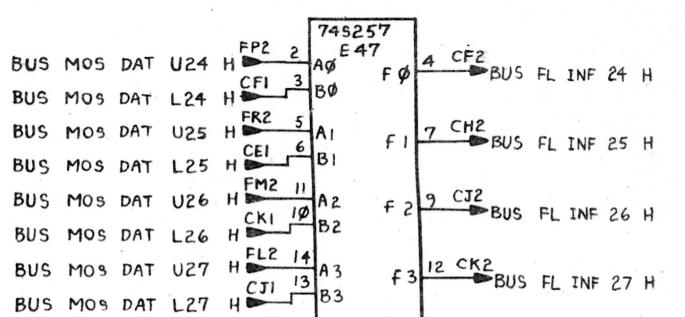
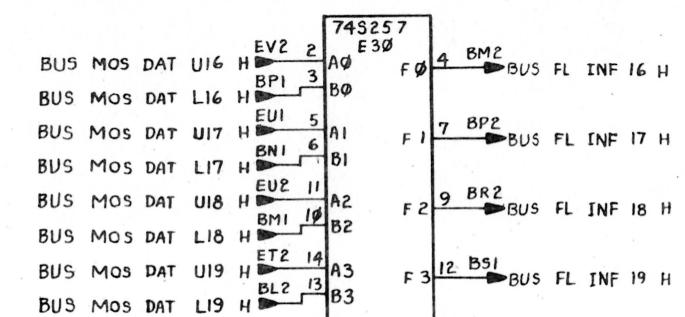
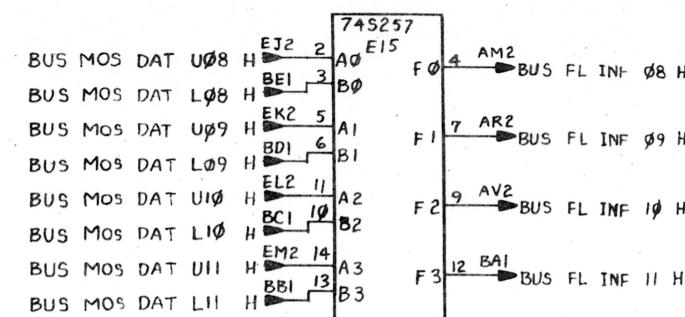
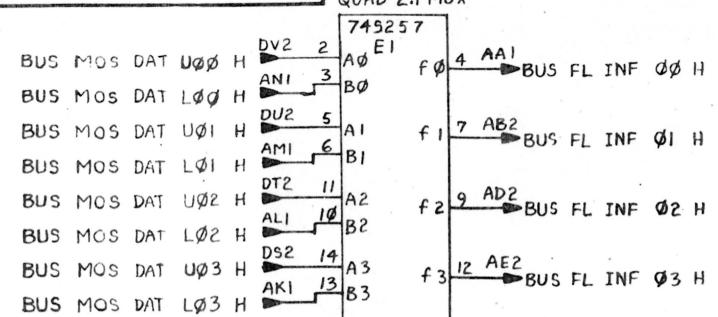
SIZE CODE  
DCS M8212-0-1  
NUMBER  
REV.  
C

SCALE 11 SHEET 15 OF 19

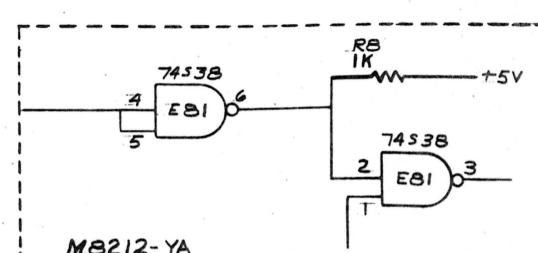
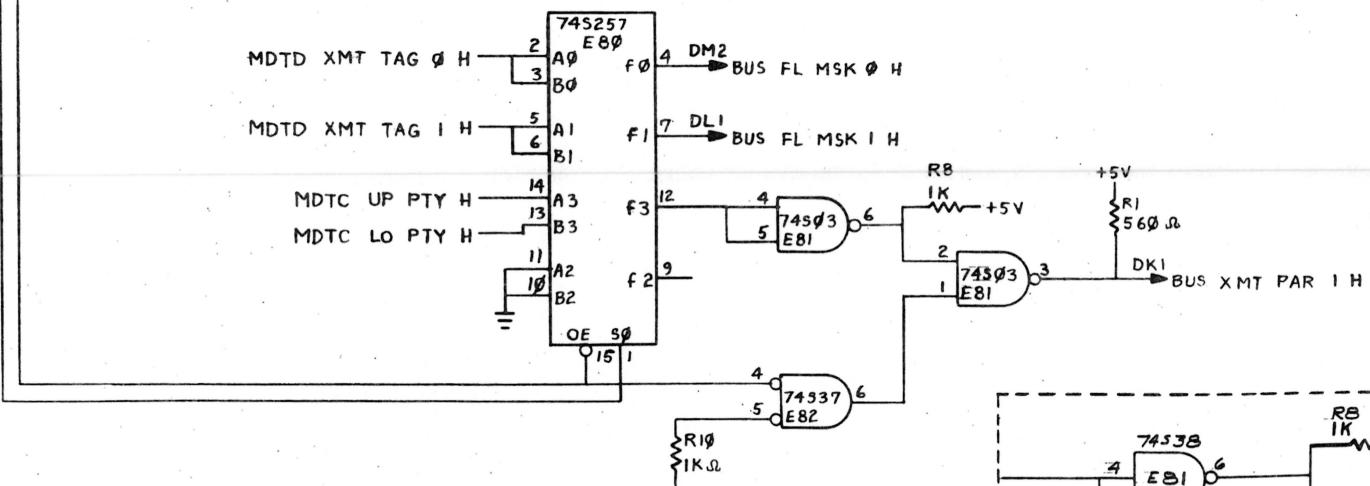
DIST. TW 1

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QUAD 2:1 MUX



74S257 FUNCTION TABLE					
INPUTS		OUTPUTS			
OE	S0	A	B	F	
L	L	L	X	L	
L	L	H	X	H	
L	H	X	L	L	
L	H	X	H	H	



(MEMORY ARRAY DATA XMIT MUX)

(SLOT 18)

TITLE  
MEMORY DATA BOARD (MDTS)  
SIZE/CODE DCS M8212-0-1  
NUMBER DIST.

SCALE 1:1 SHEET 16 OF 19 DIST.

REVISIONS		
CHK	CHANGE NO.	REV.

INSTRUMENTATION

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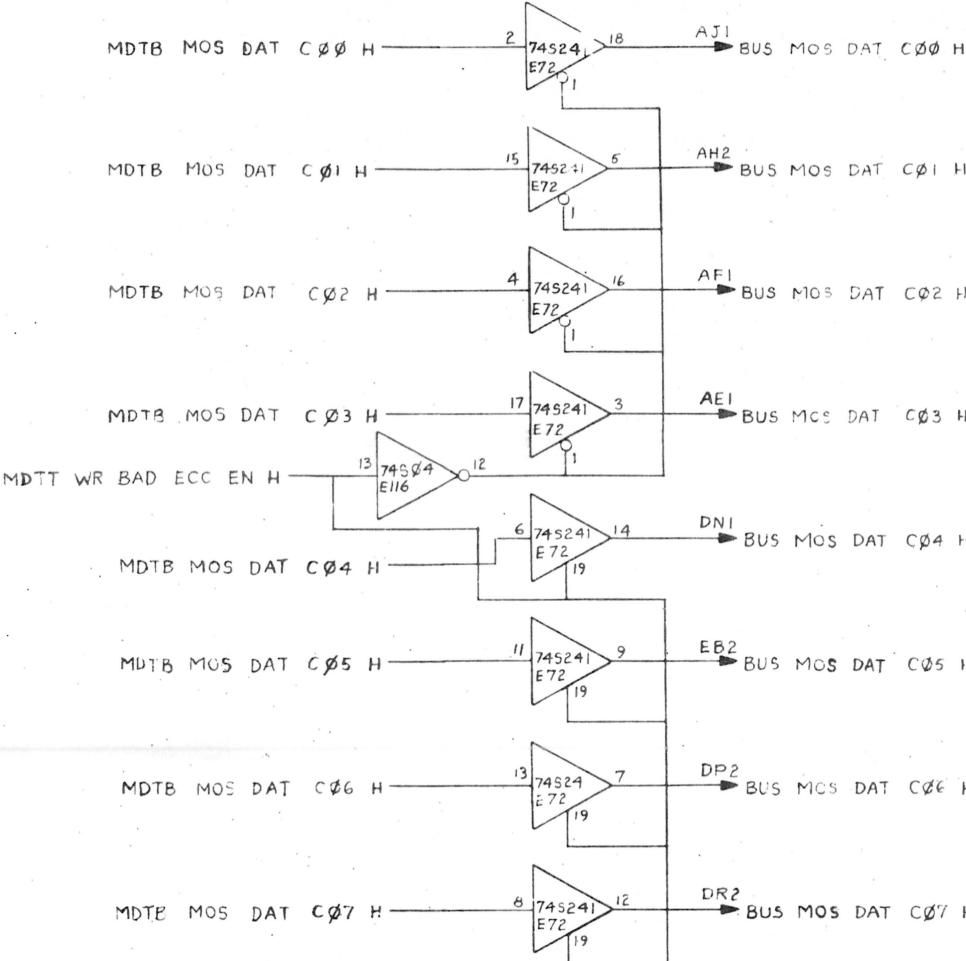
2

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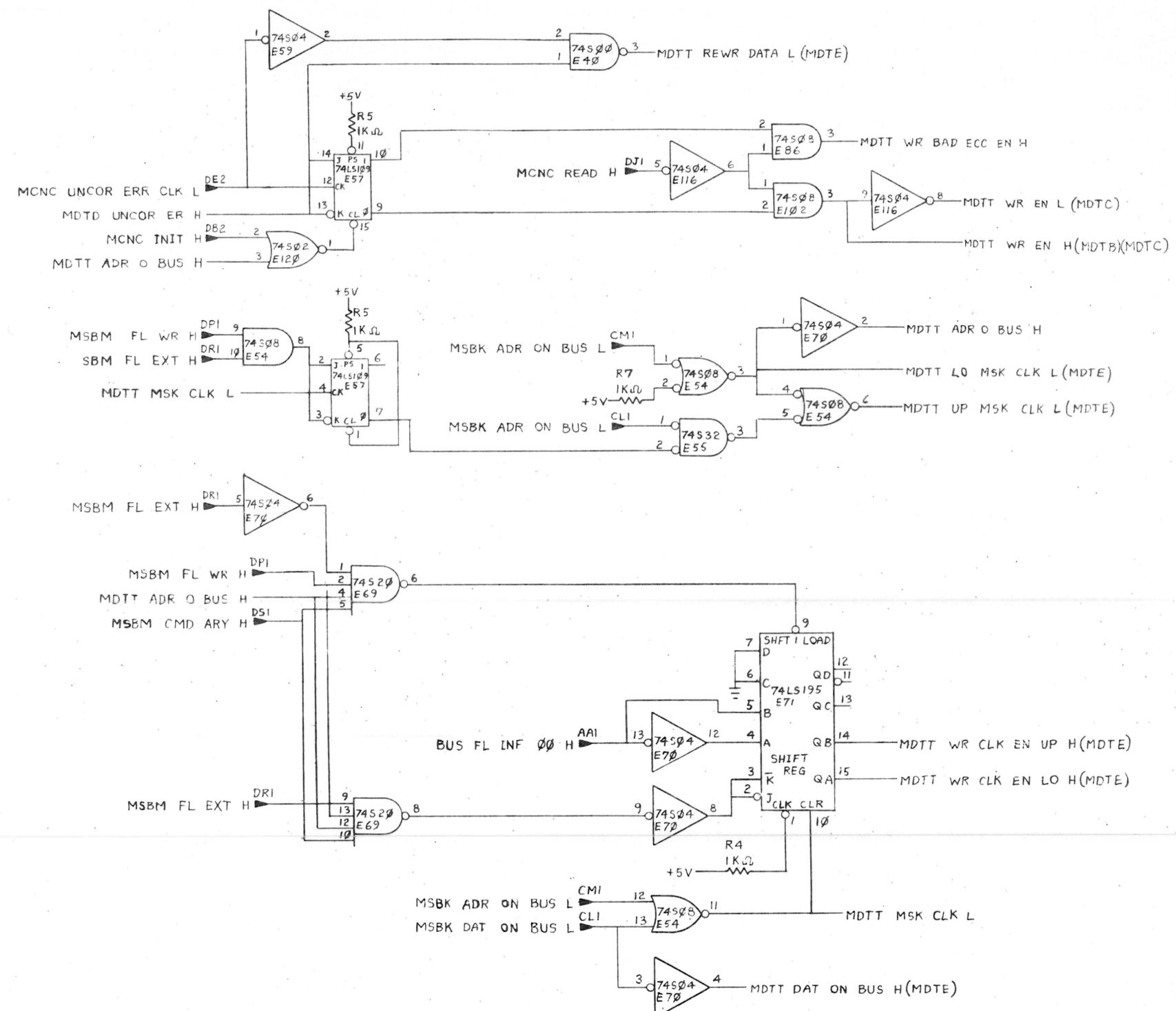
SIZE/CODE DCS M8212-0-1  
NUMBER DIST.  
REV. C

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D



C



A

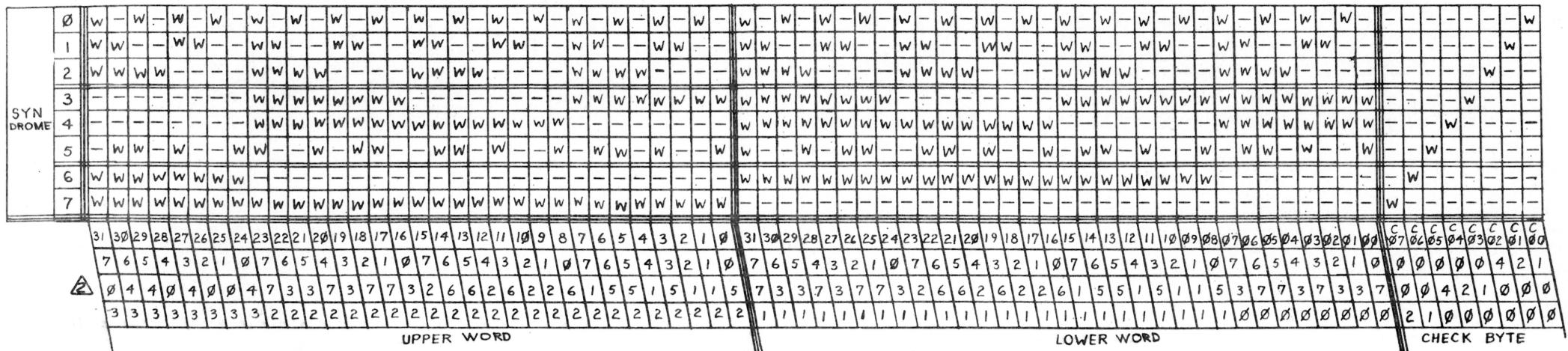
REVISIONS		
CHK	CHANGE NO.	REV.

(CHECK BIT REWRITE LOGIC)

(SLOT 18)

TITLE: MEMORY DATA BOARD (MDTT)  
SIZE CODE: DCS M8212-0-1  
NUMBER: 17 OF 19  
REV: C

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## A BRIEF DESCRIPTION OF THE ECC (ERROR CHECKING & CORRECTION)

MEMORY DESIGNS HAVE TRADITIONALLY USED ODD OR EVEN PARITY AS A MEANS OF DETECTING AN ERROR IN A GIVEN DATA WORD. A PARITY BIT IS AN EXTRA DATA BIT WHICH IS STORED ALONG WITH THE DATA WORD. IT IS GENERATED BY ADDING THE NUMBER OF ONES IN THE DATA WORD AND IF THE TOTAL IS EVEN, A ONE IS STORED IN THE MEMORY (ODD PARITY). WHEN THAT WORD IS READ FROM THE MEMORY, THE DATA WORD IS USED TO CALCULATE THE PARITY AND THEN IS COMPARED WITH THE STORED PARITY BIT ALSO READ FROM THE MEMORY. THE AGREEMENT OR DISAGREEMENT BETWEEN THE TWO BITS MEANS NO ERROR OR ERROR CONDITION IN THE DATA WORD READ FROM THE MEMORY. THIS SCHEME CAN DETECT ERRORS ONLY IF THERE WAS AN ODD NUMBER OF ERRORS AND CANNOT DETECT AN EVEN NUMBER OF BIT ERRORS. THE ECC SCHEME USED IN THE MEMORY SUBSYSTEM IS DESIGNED TO DETECT ALL SINGLE BIT ERRORS AND ALL DOUBLE BIT ERRORS. FURTHERMORE, IT CORRECTS ALL THE SINGLE BIT ERRORS WHEN THEY OCCUR. IT IS ACCOMPLISHED BY STORING, ALONG WITH THE 64 BIT DATA, EIGHT PARITY BITS, CALLED THE CHECK BITS, WHICH ARE GENERATED BY TAKING SELECTED GROUPS OF DATA BITS IN A GIVEN DATA WORD. THE SCHEME USED IS A MODIFICATION OF THE HAMMING'S CODE TO GENERATE THE CHECK BITS. WHEN PARITY IS CHECKED DURING A READ AN INCORRECT BIT WILL BE DETECTED BY PARITY CHECKING LOGIC AND WILL DEVELOP A UNIQUE ERROR SYNDROME WHICH WILL IDENTIFY AND CORRECT THE BIT IN ERROR.

DURING ANY READ OPERATION, THE EIGHT CHECK BITS READ FROM THE MEMORY WOULD BE PARITY CHECKED WITH THEIR CORRESPONDING GROUP OF DATA BITS THUS PRODUCING AN EIGHT BIT ERROR CODE THAT IS CALLED THE ERROR SYNDROME, THERE ARE 256 SYNDROMES (FOR THE EIGHT BIT CHECK) AND AN ALL ZERO SYNDROME SIGNIFIES A NO ERROR CONDITION THERE ARE 72 UNIQUE SYNDROMES POINTING TO INDIVIDUAL BITS IN THE CODED WORD.

ECC MATRIX

BIT POSITIONS WITH "W" IN THE ABOVE MATRIX ARE THE BITS USED IN ENCODING THE CORRESPONDING ROW'S CHECK BIT AND THE BIT POSITIONS MARKED "--" ARE NOT USED IN THE ENCODING OF THAT PARTICULAR ROW'S CHECK BIT.

THE PARITY CHECK IS FOR ODD PARITY (NUMBER OF ONES READ FROM THE MEMORY DATA BITS AND THEIR CORRESPONDING CHECK BIT IS ODD) ALL "1"s OR ALL "0"s IN THE QUAD WORD WILL ENCODE AN ALL "1" CHECK CODE.

FOR SINGLE BIT ERROR AN ODD NUMBER OF SYNDROME BITS WILL BE "1"s AND FOR DOUBLE BIT ERRORS AN EVEN NUMBER OF SYNDROME BITS WILL BE "1"s FOR EXAMPLE IF LOWER WORD DATA BIT  $\phi\phi$  IS IN ERROR, SYNDROME 3, SYNDROME 4, & SYNDROME 5 FAIL GIVING A  $\phi\phi111000$  SYNDROME ( $\phi7\phi_8$ ). IF LOWER WORD DATA BITS  $\phi\phi$  &  $\phi 1$  FAIL, SYNDROME  $\phi$  & SYNDROME 5 FAIL GIVING A  $\phi\phi10001$  SYNDROME, SINCE IN SYNDROME BITS 3 & 4 THEY CANCEL EACH OTHER OUT, ALL  $\phi$  SYNDROME SIGNIFIES GOOD DATA

SYNDROMES ARE SHOWN IN OCTAL

REVISIONS		
CHK	CHANGE NO.	REV

(ECC LOGIC)

(SLOT 18)

TITLE		SIZE CODE	NUMBER	REV.
MEMORY DATA BOARD		D CS	M8212-Ø-1	C
SCALE	1/1	SHEET 16 OF 19	DIST.	

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## SIGNAL NAME

## PIN M8212-YA

DSI	BUS ADMI B29 H
AAI	BUS ADMI B00 H
AB2	BUS ADMI B01 H
AD2	BUS ADMI B02 H
AE2	BUS ADMI B03 H
AF2	BUS ADMI B04 H
AJ2	BUS ADMI B05 H
AK2	BUS ADMI B06 H
AL2	BUS ADMI B07 H
AM2	BUS ADMI B08 H
AN2	BUS ADMI B09 H
AV2	BUS ADMI B10 H
BA1	BUS ADMI B11 H
BB2	BUS ADMI B12 H
BD2	BUS ADMI B13 H
BE2	BUS ADMI B14 H
BK2	BUS ADMI B15 H
BM2	BUS ADMI B16 H
BR2	BUS ADMI B17 H
BR2	BUS ADMI B18 H
BS1	BUS ADMI B19 H
BV2	BUS ADMI B20 H
CA1	EUS ADMI B21 H
CB2	BUS ADMI B22 H
CE2	BUS ADMI B23 H
CF2	EUS ADMI B24 H
CH2	BUS ADMI B25 H
CJ2	BUS ADMI B26 H
CK2	BUS ADMI B27 H
CL2	BUS ADMI B28 H
CM2	BUS ADMI B29 H
CRI	BUS ADMI B30 H
CR2	BUS ADMI B31 H
DM2	BUS ADMI MSK0 H
DL1	BUS ADMI MSK1 H
DK2	BUS ADMI MSK2 H
DL2	BUS ADMI MSK3 H
DNI	BUS ADMI PI H
DUI	MATK ARY RD EN H
EBI	MATJ CYC CLR L
FUI	MATJ ECC EN H
ED2	MATK RD DAT EN L
EC1	MATK RD LO SEL L
EJ1	MATJ WR EN LO L
EF1	MATJ WR EN UP H
DMI	MATJ ARY DAT CK H
DD2	MATJ CHK BIT DAT CK H
DD2	MATJ CHK BIT DAT CK H

## M8212

BUS CMD ARY H
BUS FL INF 00 H
BUS FL INF 01 H
BUS FL INF 02 H
BUS FL INF 03 H
BUS FL INF 04 H
BUS FL INF 05 H
BUS FL INF 06 H
BUS FL INF 07 H
BUS FL INF 08 H
BUS FL INF 09 H
BUS FL INF 10 H
BUS FL INF 11 H
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BUS FL INF 27 H
BUS FL INF 28 H
BUS FL INF 29 H
BUS FL INF 30 H
BUS FL INF 31 H
BUS FL MSK 0 H
BUS FL MSK 1 H
BUS FL MSK 2 H
BUS FL MSK 3 H
BUS X FAR 1 H
MCNA ARY RD EN H
MCNA CLR L
MCNA ECC EN H
MCNA RD DAT EN L
MCNA RD LO SEL L
MCNA WR EN LO H
MCNA WR EN UP H
MCNB ARY DAT CK H
MCNB CHK BIT DAT CK H
MCNB CHK DAT CK H

## PIN M8212-YA

DB2	MATR INIT H
DF2	MATJ MSK CLR L
ELI	MATJ RD EN H
DJ1	MATJ GEN ECC L
DF1	MATJ TAG CLK L
DE2	MATJ UNCORR ERR CLK L
EAI	MATJ XMT DAT CK H
EMI	MATF CRD INH L
FSI	MATE DIAG EN L
FRI	MATD FRC CHK 0 H
FPI	MATD FRC CHK 1 H
FNI	MATD FRC CHK 2 H
FMI	MATD FRC CHK 3 H
FL1	MATD FRC CHK 4 H
FK2	MATD FRC CHK 5 H
FK1	MATD FRC CHK 6 H
FJ1	MATD FRC CHK 7 H
FJ2	MDTA SYN 2 H
CMI	MATH ADR ON BUS L
CLI	MATH DAT ON BUS L
DRI	BUS ADMI EXT H
DF1	BUS ADMI B29 H

## M8212

MCNB INIT H
MCNB MSK CLR L
MCNB RD EN H
MCNB READ H
MCNB TAG CLK L
MCNB UNCORR ERR CLK L
MCNB XMT DAT CK H
MCNE CRD INH L
MCNE DIAG EN L
MCNL FRC CHK 0 H
MCNL FRC CHK 1 H
MCNL FRC CHK 2 H
MCNL FRC CHK 3 H
MCNL FRC CHK 4 H
MCNL FRC CHK 5 H
MCNL FRC CHK 6 H
MCNL FRC CHK 7 H
MDTC SYN 2 H
MDTE FULL WR EN H
MSSH ADR O BUS L
MSBH DAT O BUS L
MSBJ FL EXT H
MSBJ FL WR H

## NOTE

THE SIGNAL NAMES FOR SIGNALS THAT LEAVE THE MODULE THAT APPEAR IN THIS SCHEMATIC, MATCH THE SIGNAL NAMES USED THROUGHOUT THE MS780 AND ARE LISTED IN THE TABLE UNDER THE M8212 COLUMN. THE SAME INPUT-OUTPUT PINS ON THE MODULE HAVE DIFFERENT NAMES WHEN THE MODULE IS USED WITH THE MA780. THESE NAMES ARE LISTED IN THE M8212-YA COLUMN.

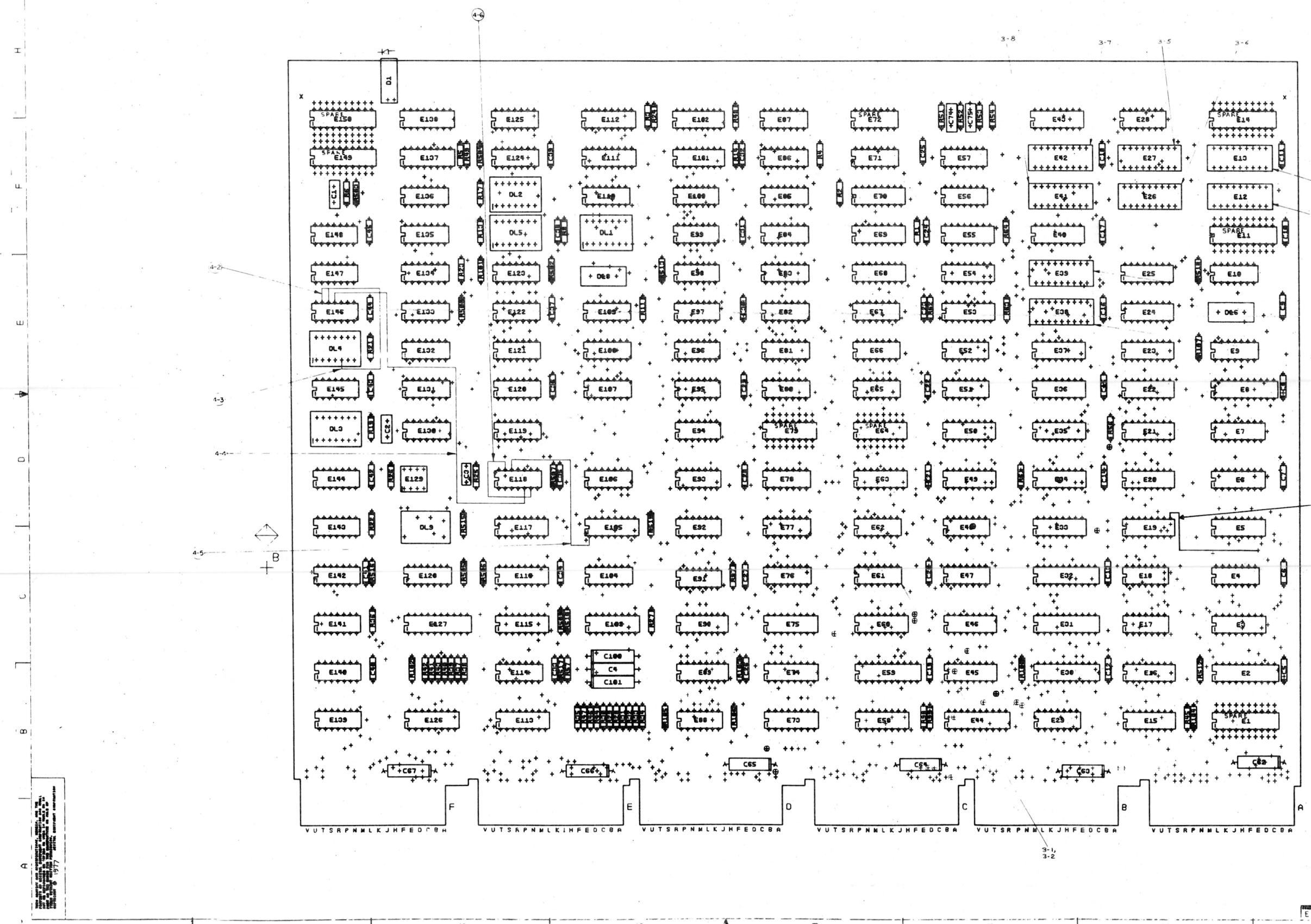
CONTINUE

REVISION HISTORY		
DATE	ECO NUMBER	REV.

## SIGNAL NAME CONVERSION TABLE FOR M8212 YA

DOCUMENT NUMBER		
SIZE	CODE	NUMBER
DCS	M8212-0-1	REV. C
SCALE	1	SHEET 19 OF 19

## COMPONENT SIDE VIEW



DATE	6-27-71
DRW.	10-27-71
CHK.	10-27-71
ENC.	10-27-71
PROJ. ENG.	10-27-71
PROD.	10-27-71
SIZE CODE	10-27-71
SH. NO.	10-27-71
NEXT MEMBER	M8213-B-0
ETCH REV.	C-PI
PCB DESIGN DRTR BRSC REV C	

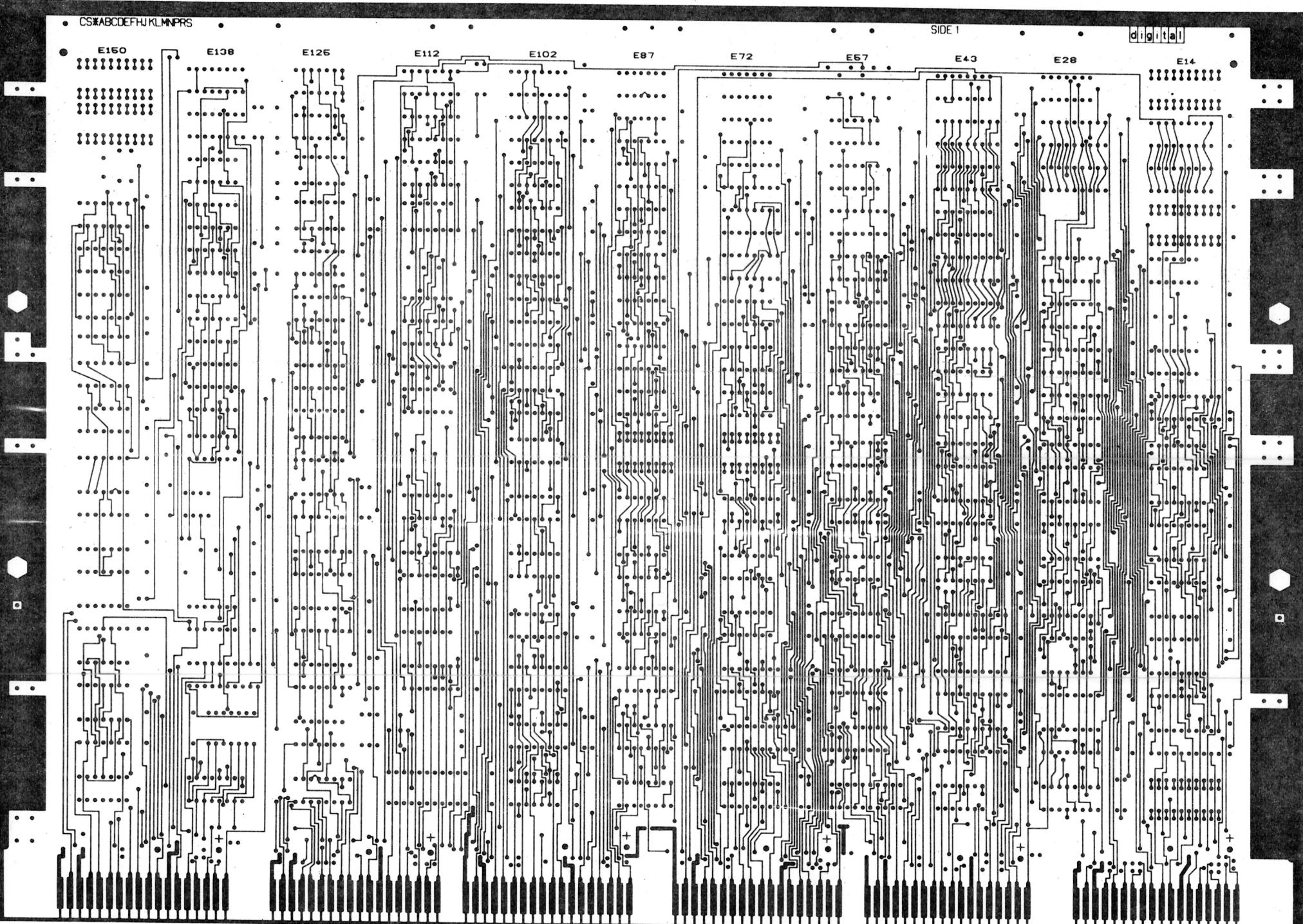
PCB CLASS	PCB-1
PCB NUMBER	PCB-1
PCB DATE	6-27-71
PCB REV.	C-PI
PCB DESIGNER	DRTR
PCB DRAWN BY	BRSC
PCB CHECKED BY	REV C

NOTES:	
1:	WELD POINTS TO BPS
2:	BOARDS ARE MOUNTED ON SIDE AND FASTENED
3:	BOARDS ARE MOUNTED ON SIDE AT HOSE END
4:	RODS MOUNTED ON SIDE AT HOSE END
5:	RODS MOUNTED ON SIDE AT HOSE END
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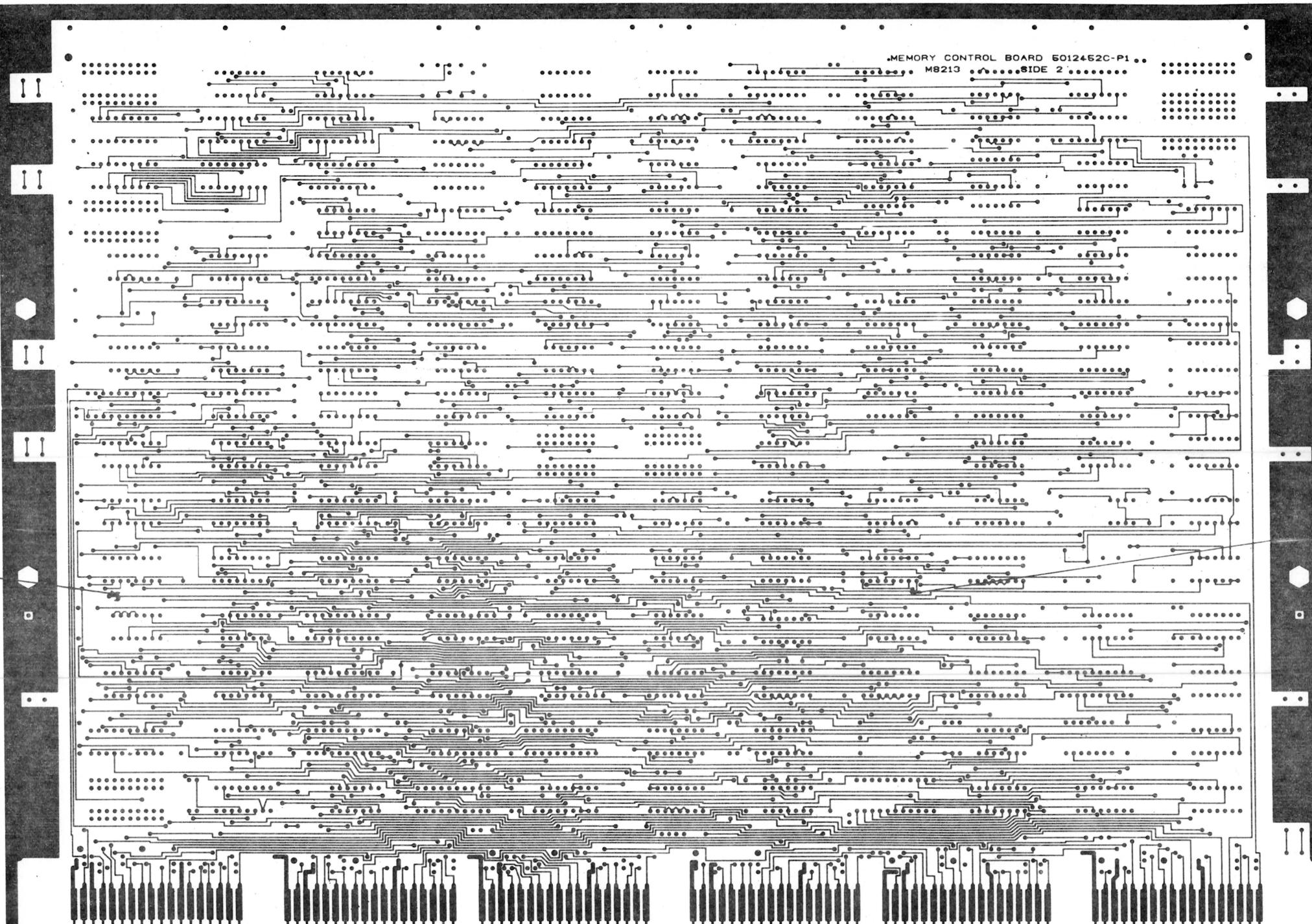
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J  
REWORK INSTRUCTIONS

ECO #3

COMPONENT DELETES SIDE 1:

3-1. E61 (P/N 1910527-00)

COMPONENT ADDS SIDE 1:

3-2. E61 (P/N 1910536-00)

3-3. P/N 23162F1-00 AT E12

3-4. P/N 23161F1-00 AT E12

3-5. P/N 23162F1-00 AT E27

3-6. P/N 23163F1-00 AT E26

3-7. P/N 23164F1-00 AT E42

3-8. P/N 23165F1-00 AT E41

3-9. P/N 23166F1-00 AT E39

3-10. P/N 23167F1-00 AT E38

H  
REWORK INSTRUCTIONS

ECO #4

ETCH CUT SIDE 2:

4-1. CUT ETCH AT E105-1

WIRE ADDS SIDE 1:

4-2. E146-13 TO E146-12

4-3. E146-12 TO DL4-5

4-4. E146-11 TO E118-5

4-5. E118-12 TO E105-1

4-6. E118-6 TO E118-13

F  
REMOVE IC SOCKETS (P/N 12-11666-00)

AT: E12; E13; E26; E27; E38; E39; E41; E42

ADD IC SOCKETS (P/N 12-15006-03)

AT: E12; E13; E26; E27; E38; E39; E41; E42

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LINE	ITEM	DOCUMENT NUMBER	PART NUMBER	DESCRIPTION	QTY	PER VARIATION	REFERENCE DESIGNATOR
1	1	E-MD-5012452-0-0	5012452-00	M8213	1		
2	2		1000011-00	.47.0 MMF 100V 5%200PPM MICA	1		C1
3	3		1000024-00	.470.0 MMF 100V 5%200PPM MICA	1		C2
4	4		1001610-01	.01 MFD50/100V +80-20% DISC	1		C3
5	5		1011605-00	.100 MFD 10V 10% S.TANT	3		C4,C100,C101
6	6		1001739-00	.27.0 MMF 100V 5%200PPM MICA	2		C74,C75
7	7		1012784-00	.047 MFD 50V +80-20% CER	41		C5-C45
8	8		1012084-01	.8 MFD 25V +75-10% AL EL	6		C62-C67
9	9		1110324-00	LED 1MC10@10MA PIV=3	1		D1
10	10		1300365-00	1.0 K .25 W 5.0 % CC	62		R1-R5,R11,R14,R22-R24,R27-R49, R51,R54,R57,R61-R64,R98-R107, R500,R509,R510,R519,R502-R507, R56,R512
						CONT	
						CONT	
						CONT	
11	11		1300247-00	.120.0 .25 W 5.0 % CC	6		R8,R13,R17,R19,R21,R515
12	12		1300295-00	.330.0 .25 W 5.0 % CC	1		R516
13	13		1300309-00	.390.0 .25 W 5.0 % CC	2		R513,R518
14	14		1301890-00	.560.0 .25 W 5.0 % CC	1		R97
15	15		1302645-00	1.10 K .25 W 1.0 % RN55D-F10	1		R25
16	16		1300391-00	1.50 K .25 W 5.0 % CC	1		R517
17	17		1302465-00	18.0 K .25 W 5.0 % CC	1		R6
18	18		1309412-00	18.20 K .25 W 1.0 % RN55D-F10	1		R26
19	19		1302388-00	2.0 K .25 W 5.0 % CC	2		R52,R53
20	20		1611243-00	DELAY=25-250NS,10TAPS RCL=L-183	5		DL1-DL5
21	21		1605528-00	DELAY= 30NS,0TAPS DL5184	2		DL6,DL8
22	22		1611532-00	DELAY= 13NS,100 OHM IMP	1		DL9
23	23		1910532-00	74S00 NAND GATE-QUAD 2IN	3		E28,E83,E110
24	24		1912799-00	L500 NAND-GATE-QUAD 2IN,P	1		E141
25	25		1912388-00	74S02 NOR GATE-QUAD 2IN,PO	3		E51,E120,E131
26	26		1912801-00	LS02 NOR-GATE-QUAD 2IN	1		E139
27	27		1910533-00	74S03 NAND GATE-QUAD 2IN,O	2		E57,E91

REVISION HISTORY		BASIC PART NO: M8213		DRN:	F.SMART	DATE: 09-JUN-78	D I G I T A L
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---	INIT	I D	SECTION,VARIATION INDEX	CHK'D:	F.SMART	DATE: 09-JUN-78	TITLE PARTS LIST
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LINE ITEM	DOCUMENT NUMBER	PART NUMBER	DESCRIPTION	QTY PER VARIATION	REFERENCE DESIGNATOR
				00	
28	28	1910534-00	74S04 INVERTER GATE-HEX 1I	9	E10,E62,E65,E71,E98,E100,E118,
29	29	1912803-00	774LS04 INVERTER GATE, HEX	2	E135,E148
30	30	1912389-00	74S08 AND GATE-QUAD 2IN,PO	10	E56,E114
31	31	1910536-00	74S10 NAND GATE-TRIPLE 3IN	4	E29,E52,E66,E78,E85,E95,E97,
32	32	1910537-00	74S11 AND GATE-TRIPLE 3INP	6	E104,E121,E128
33	33	1910539-00	74S20 NAND GATE-DUAL 4INPU	2	E76,E87,E99,E61
34	34	1913340-00	74S32 OR GATE-QUAD 2IN	6	E67,E80,E81,E106,E107,E142
35	35	1912816-00	LS32 OR GATE-QUAD 2IN,POS	1	E136,E147
36	36	1912746-00	DEC 74S37 NAND GATE-QUAD 2IN	4	E77,E82,E119,E144,E146,E122
37	37	1911712-00	74S51 AND-OR GATE-INVERT D	3	E88
38	38	1910542-00	74S64 A-O-I GATE 4-2-3-2	3	E84,E94,E108,E96
39	39	1910544-00	74S74 FF-D DUAL,EDGE TRIGG	2	E92,E130,E132
40	40	1912829-00	LS86 X-OR GATE-QUAD 2IN	1	E86,E125,E134
41	41	1912833-00	LS109 FF-JK DUAL,POS EDGE	4	E109,E133
42	42	1910545-00	74S112 FF-JK DUAL,EDGE TRIG	7	E140
43	43	1912834-00	LS112 FF-JK DUAL,EDGE TRIG	3	E58,E89,E111,E112
44	44	1910546-00	74S140 NAND GATE-DUAL 4INPU	6	E69,E70,E101,E102,E105,E138,E68
45	45	1912847-00	LS157 MUX 1 OF 2(QUAD)	2	E43,E53,E55
46	46	1910548-00	74S157 MUX 1 OF 2 (QUAD)	4	E9,E93,E123,E124,E145,E143
47	47	1910650-00	74161 COUNTER,SYNCHR. UP	4	E15,E16
48	48	1912697-00	LS174 FF-D HEX W/CLEAR	5	E60,E74,E75,E116
49	49	1912853-00	LS175 FF-D QUAD	1	E73,E90,E103,E117
50	50	1913493-00	74S241 OCTAL BUFFER,TRI-STA	3	E5,E21,E34,E45,E46
51	51	1912646-00	LS253 MUX 1 OF 4 (DUAL)	16	E19
52	52	1911641-00	SN 74S257 MUX,QUAD 2 TO 1	1	E2,E30,E44
53	53	1911573-00	74S280 PARITY GEN/CHKR,9BIT	5	E3,E6,E7,E20,E22,E23,E24,E25,
54	54	1913670-00	74S373 LATCH 8BIT TRASP TR	5	E33,E35,E36,E37,E49,E50,E54,E40
55	55	1911944-00	555CN TIMER,FUNCT.BLOCK	1	E115
56	56	1910951-00	9602 ONE SHOT-DUAL	1	E4,E17,E18,E47,E48
57	57	1910550-00	74S174 FF-D HEX	1	E8,E31,E32,E59,E127
58	58	23372A2-00	A2-02,A2-04	2	E129
59	59	1210711-02	/REPLACED BY 12-16988-02	1	E137
60	60	9000024-01	EYELET, ROLLED FLANGE, .121 OD X	12	E63
61	61	1215006-03	SOCKET 18PIN IC LOW PROFILE	8	E113,E126
62	62	9008864-00	TAPE, DOUBLE COATED, 3/8" WIDE X	A/R	XE12,XE13,XE26,XE27,XE38,XE39,
63	63	9105740-55	WIRE(WRAP)30AWG	UL1423	XE41,XE42
64	64	23160F1-00	F1-01	A/R	
65	65	23161F1-00	F1-01	1	E13
66	66	23162F1-00	F1-01	1	E12
67	67	23163F1-00	F1-01	1	E27
68	68	23164F1-00	F1-01	1	E26
69	69	23165F1-00	F1-01	1	E42
70	70	23166F1-00	F1-01	1	E41
71	71	23167F1-00	F1-01	1	E39
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I D I I G I I T I A I L I      MEMORY CONTROL BOARD

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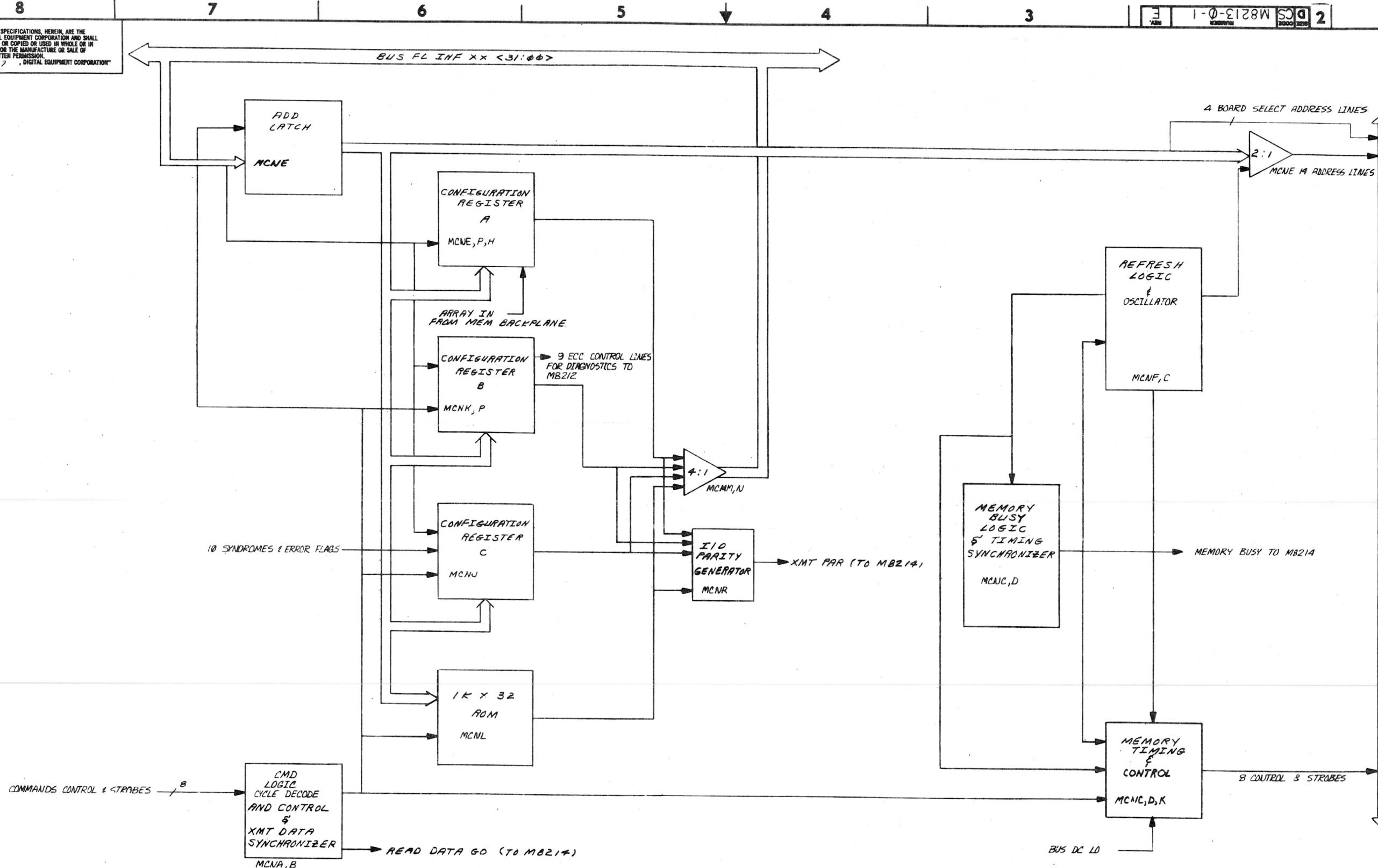
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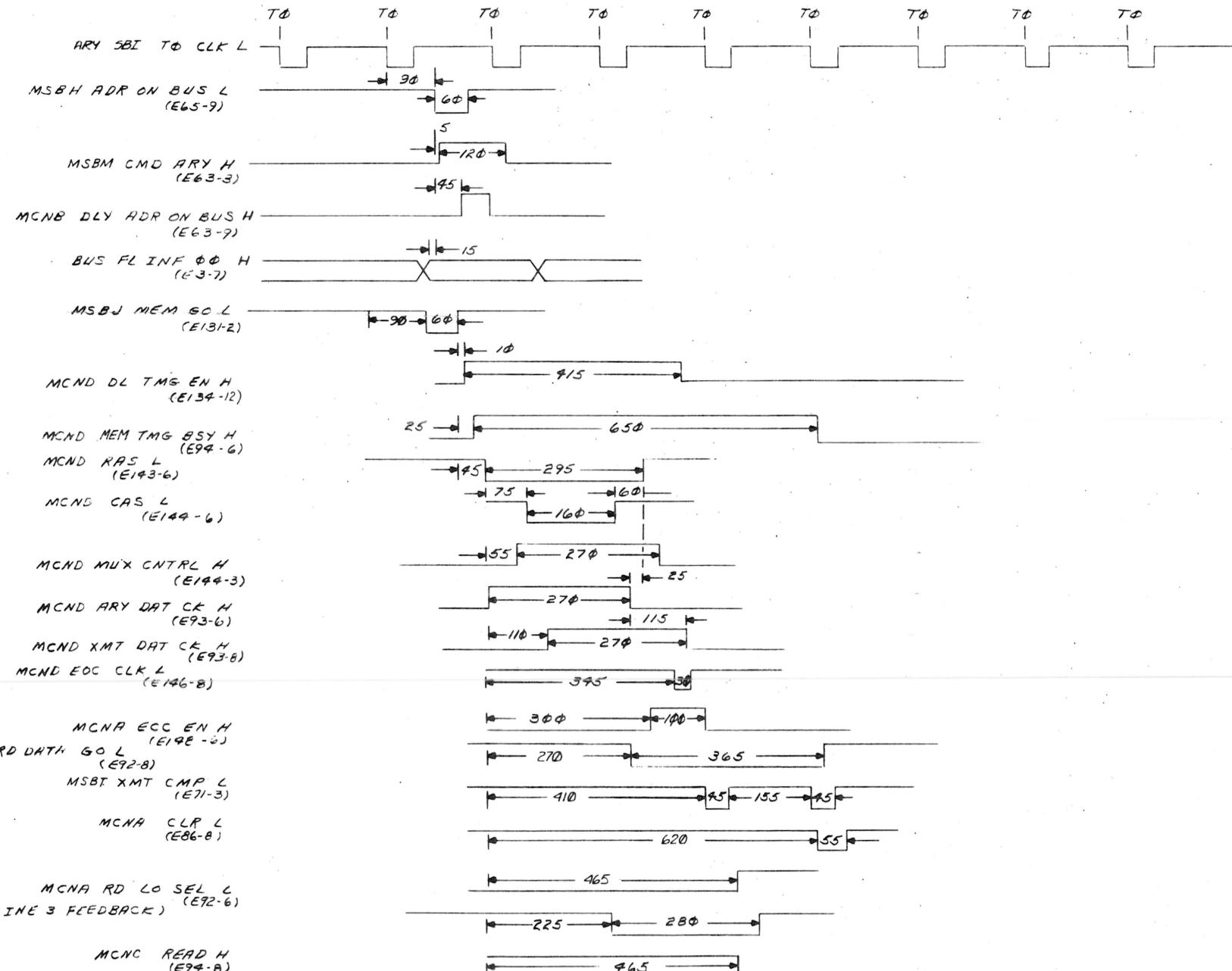
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MB213-TW004	R
1978-06-20	
R. CHUMASALA	
MB213-TW004	S
1978-06-20	
R. CHUMASALA	
MB213-TW004	T
1978-06-20	
R. CHUMASALA	
MB213-TW004	U
1978-06-20	
R. CHUMASALA	
MB213-TW004	V
1978-06-20	
R. CHUMASALA	
MB213-TW004	W
1978-06-20	
R. CHUMASALA	
MB213-TW004	X
1978-06-20	
R. CHUMASALA	
MB213-TW004	Y
1978-06-20	
R. CHUMASALA	
MB213-TW004	Z
1978-06-20	
R. CHUMASALA	
MB213-TW004	A
1978-06-20	
R. CHUMASALA	
MB213-TW004	B
1978-06-20	
R. CHUMASALA	
MB213-TW004	C
1978-06-20	
R. CHUMASALA	
MB213-TW004	D
1978-06-20	
R. CHUMASALA	
MB213-TW004	E
1978-06-20	
R. CHUMASALA	
MB213-TW004	F
1978-06-20	
R. CHUMASALA	
MB213-TW004	G
1978-06-20	
R. CHUMASALA	
MB213-TW004	H
1978-06-20	
R. CHUMASALA	
MB213-TW004	I
1978-06-20	
R. CHUMASALA	
MB213-TW004	J
1978-06-20	
R. CHUMASALA	
MB213-TW004	K
1978-06-20	
R. CHUMASALA	
MB213-TW004	L
1978-06-20	
R. CHUMASALA	
MB213-TW004	M
1978-06-20	
R. CHUMASALA	
MB213-TW004	N
1978-06-20	
R. CHUMASALA	
MB213-TW004	O
1978-06-20	
R. CHUMASALA	
MB213-TW004	P
1978-06-20	
R. CHUMASALA	
MB213-TW004	Q
1978-06-20	
R. CHUMASALA	
MB213-TW004	R
1978-06-20	
R. CHUMASALA	
MB213-TW004	S
1978-06-20	
R. CHUMASALA	
MB213-TW004	T
1978-06-20	
R. CHUMASALA	
MB213-TW004	U

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## NOTE

1. THIS TIMING CAN BE OBSERVED BY FORCING THE CONSOLE TO LOOP ON AN EXAMINE TO MEMORY ARRAY ADDRESS + BYPASSING THE CACHE - D/I/D IC 18000 ALSO SUPPRESS TERMINAL PRINTOUT (CTRL O)



REVISIONS		
CHK	CHANGE NO.	REV.

B.I.B. P-146

DEC FORM NO.  
DOD 100

8

7

6

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4

3

2

1

(INTERNAL TIMING FOR EXTENDED READ CYCLE (WITHOUT ERROR))

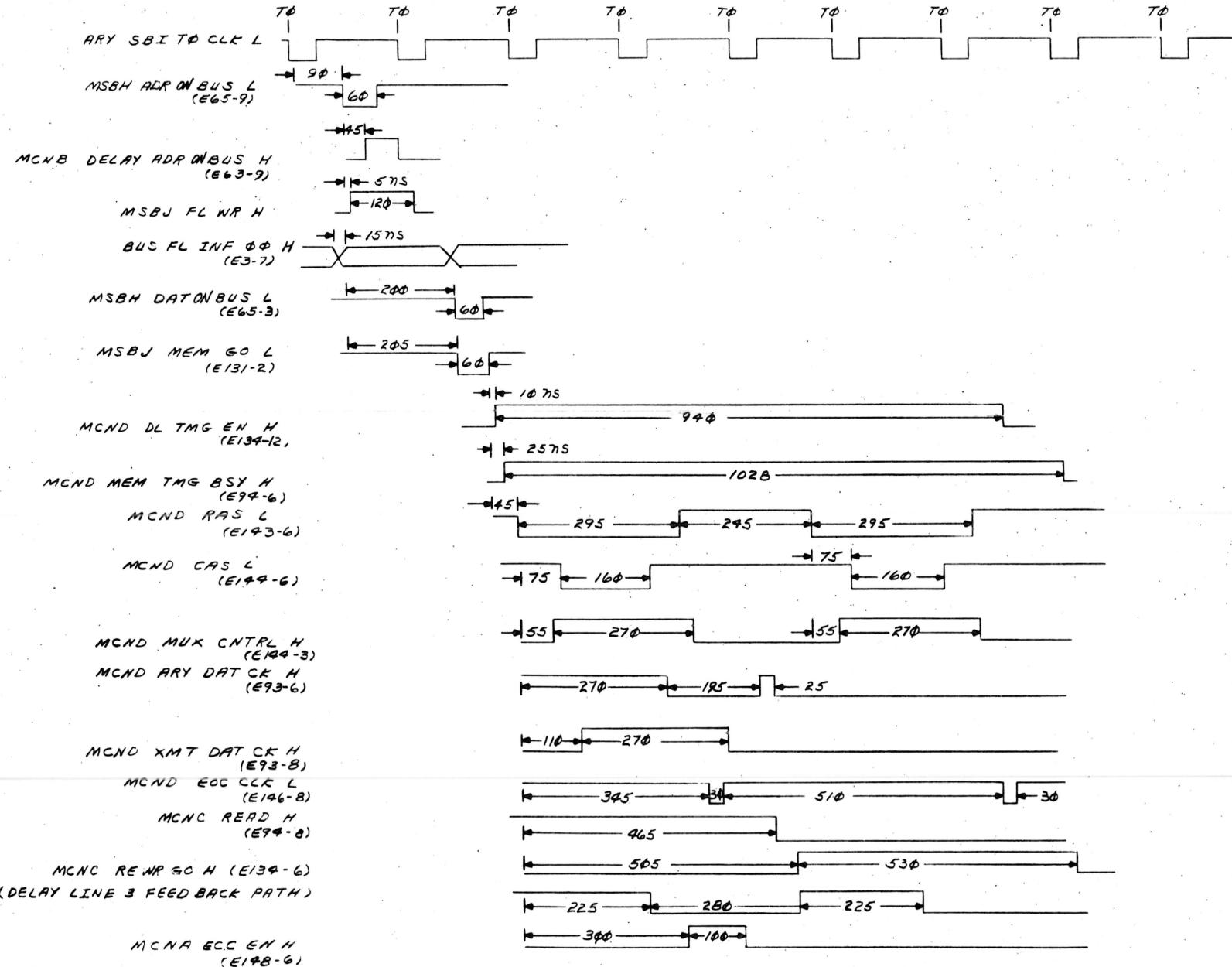
TITLE			MEMORY CONTROL BOARD	SIZE CODE	D	NUMBER	REV.
					CS	M8213-Φ-1	E
SCALE	+	+	SHEET	2 OF 17	DIST.		

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NOTES:

▲ THIS TIMING POINT IS SHOWN TO ALLOW SYSTEM TEST PEOPLE TO UNCOVER DELAY LINE OSCILLATION PROBLEMS QUICKLY DUE TO MISWIRING OR SOLDER SHORTS.

▲ THIS TIMING CAN BE OBSERVED BY FORCING THE CONSOLE TO LOOP ON A DEPOSIT TO A MEMORY ARRAY ADDRESS.



▲ E135-10 (DELAY LINE 3 FEED BACK PATH)

REVISIONS		
CHK	CHANGE NO.	REV.

(INTERNAL TIMING FOR WRITE MASK CYCLE (E))

TITLE MEMORY CONTROL BOARD  
SIZE CODE DCS NUMBER M8213-0-1  
REV. E

SCALE ↑ ↑ SHEET 3 OF 17 DIST.

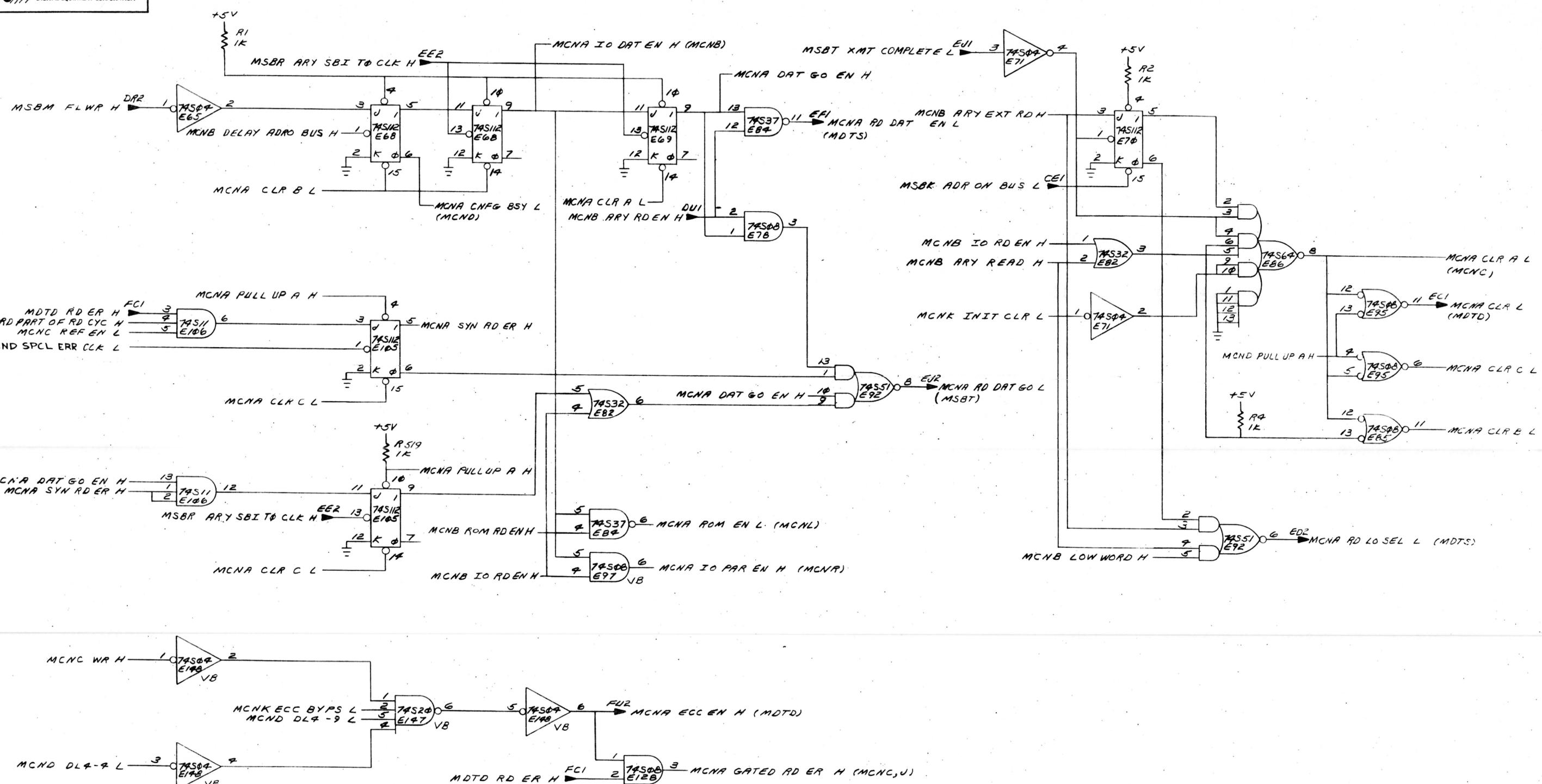
SIZE CODE DCS NUMBER M8213-0-1  
REV. E

DIST.

TW 1

8 7 6 5 4 3 2 1

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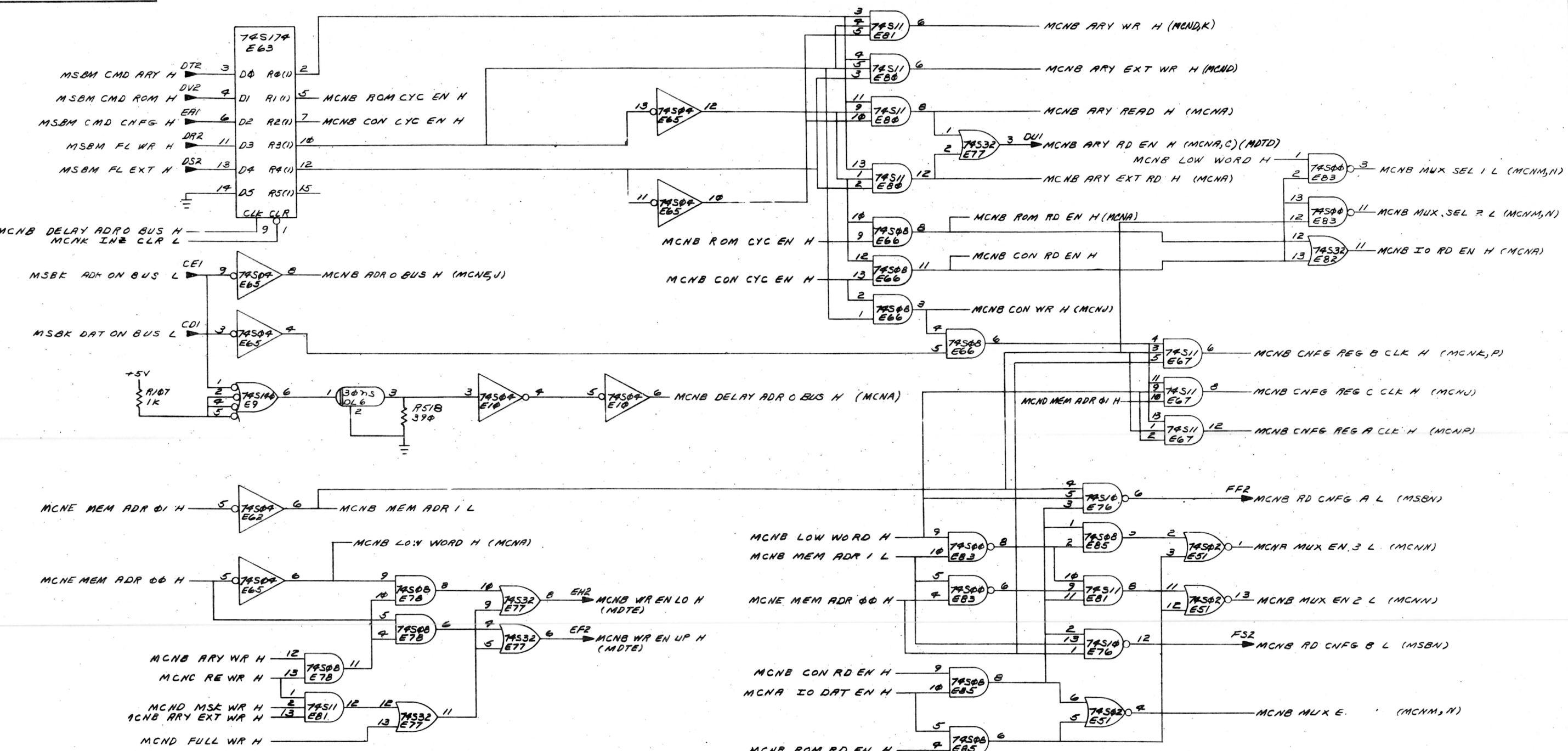
REVISIONS		
CHK	CHANGE NO.	REV.

PRINT NAME OR NUMBER  
IN SPACES P-1555

(READ DATA SYNCHRONIZER-DATA MUX SELECT-ECC ENABLE LOGIC) (SLOT 19)

TITLE	MEMORY CONTROL BOARD (MCNA)	SIZE CODE	NUMBER	REV.
SCALE	+	SHEET	4 OF 17	DIST.

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(SLOT 19) CYCLE DECODE AND TO DATA MUX CONTROL LOGIC

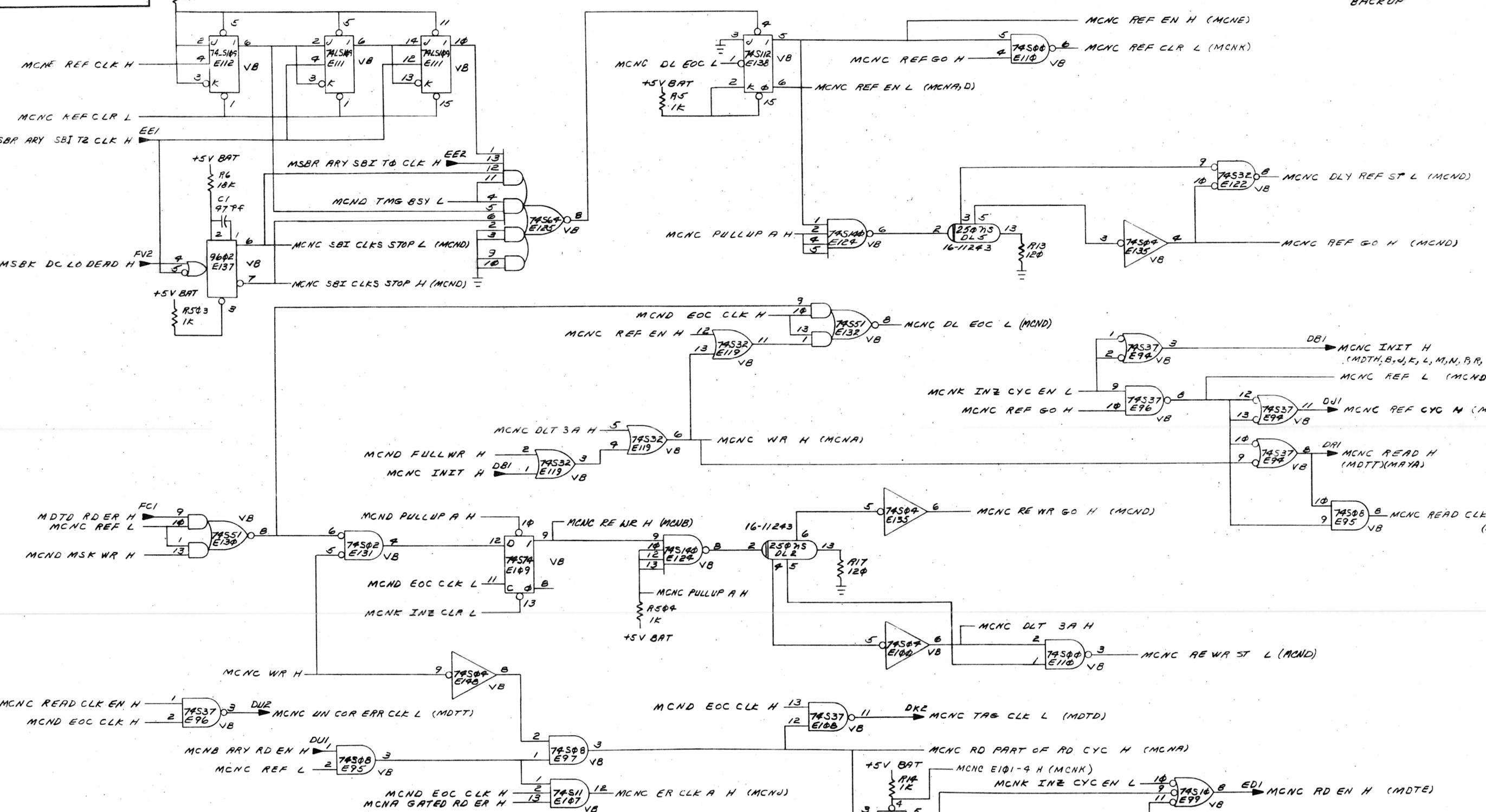
REVISIONS		
CHK	CHANGE NO.	REV.

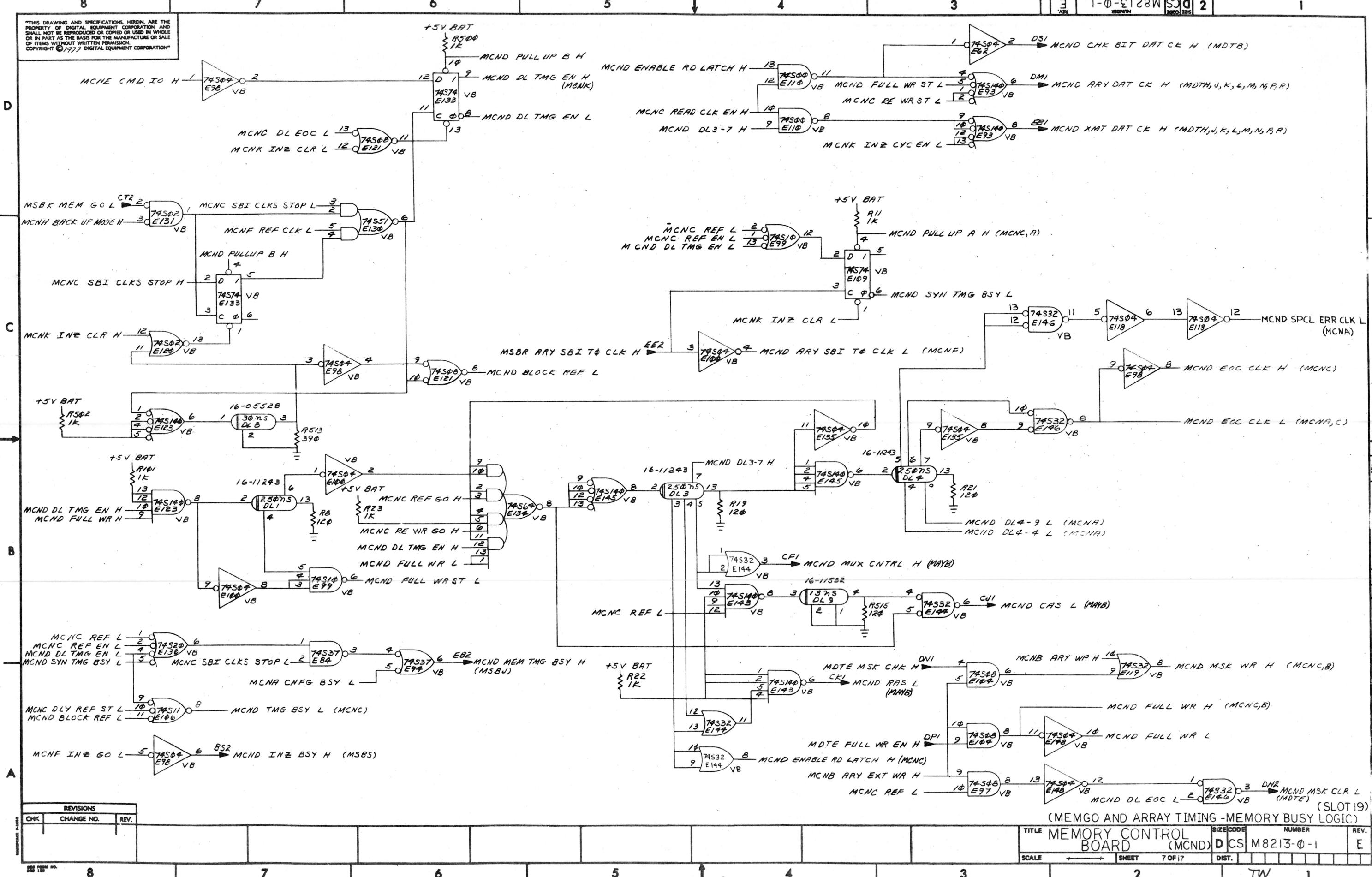
**TITLE** MEMORY CONTROL  
BOARD (MCN)

	SIZE CODE	NUMBER	REV.
JB)	D CS	M8213-Ø-1	E

TM 1

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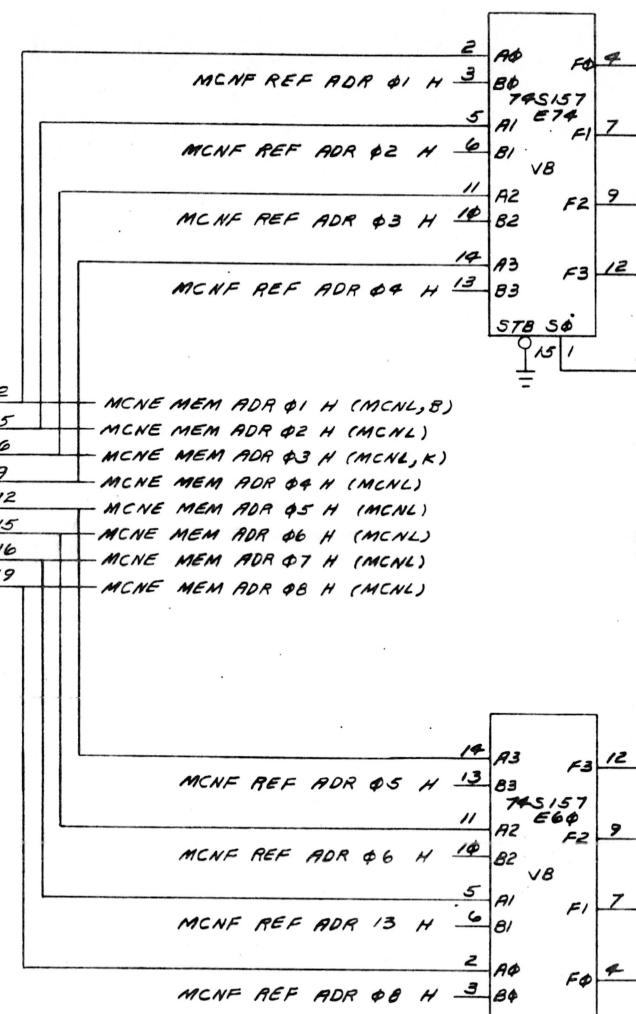
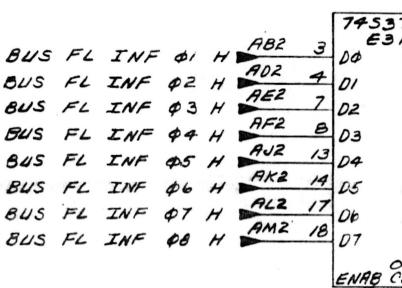
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D

C

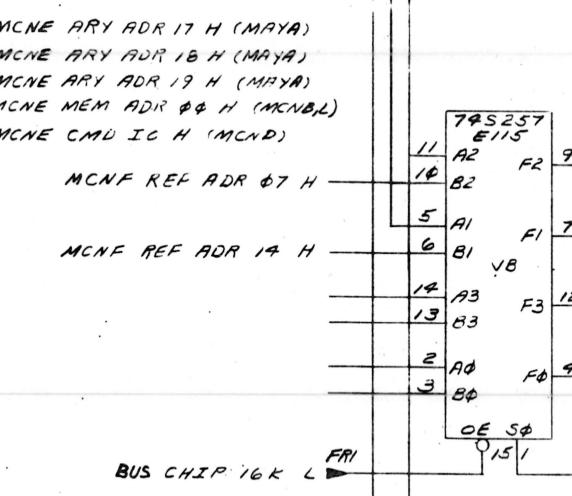
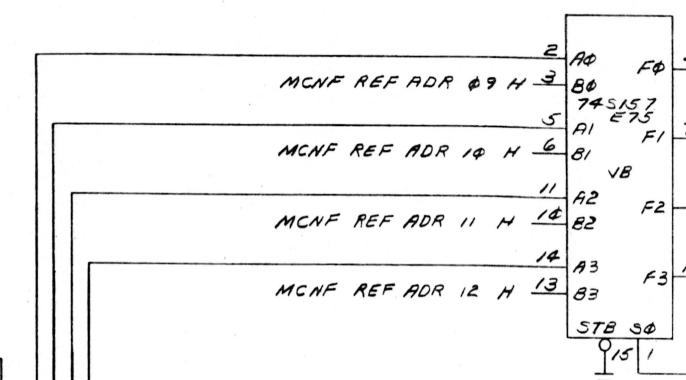
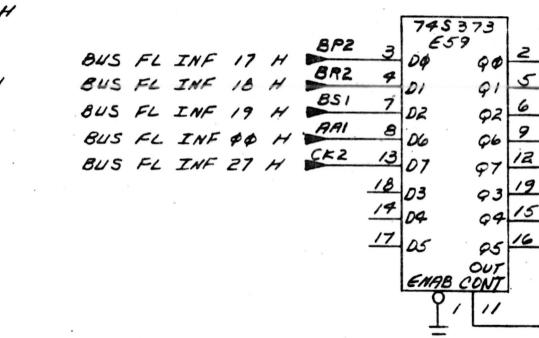
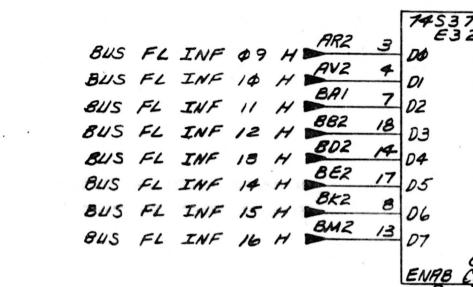
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A

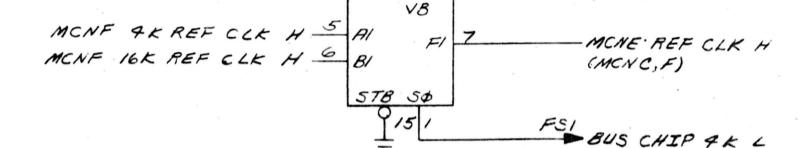


MCNB ADR 0 BUS H

MCNC INIT H  
MCNC REF EN H



BUS CHIP 16K L FRI



REVISIONS			ADDRESS REGISTERS & MULTIPLEXER			(SLOT 19)		
CHK	CHANGE NO.	REV.						
						TITLE	MEMORY CONTROL BOARD (MCNE)	SIZE CODE DCS M8213-0-1 NUMBER E

80010000	8	1	7	6	5	4	3	2
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8

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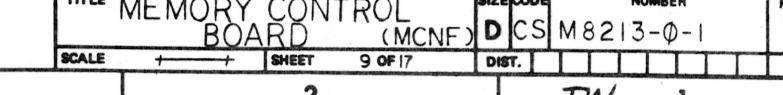
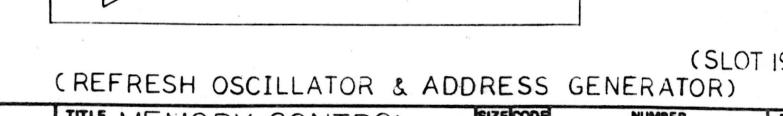
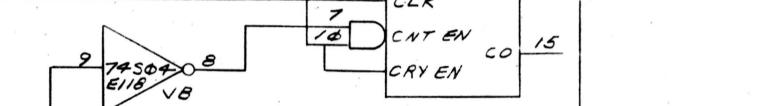
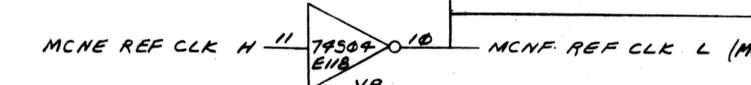
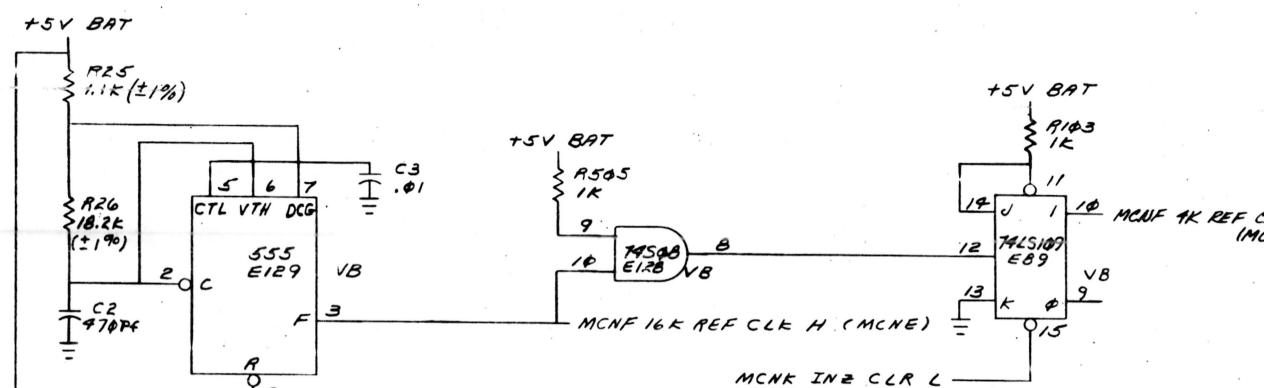
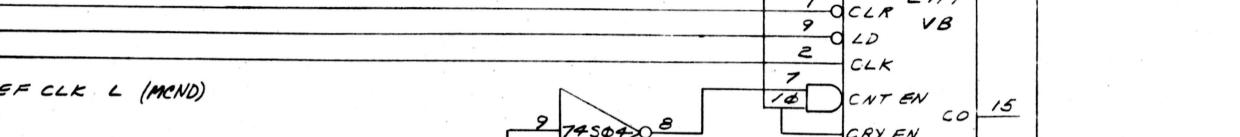
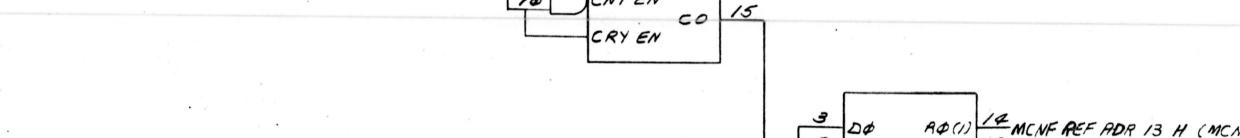
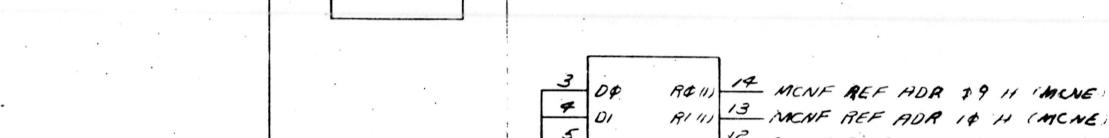
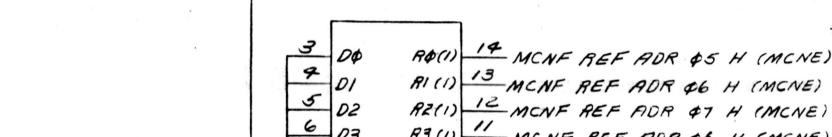
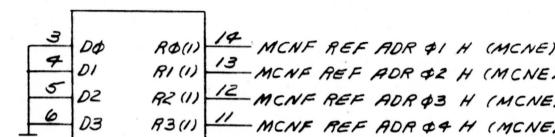
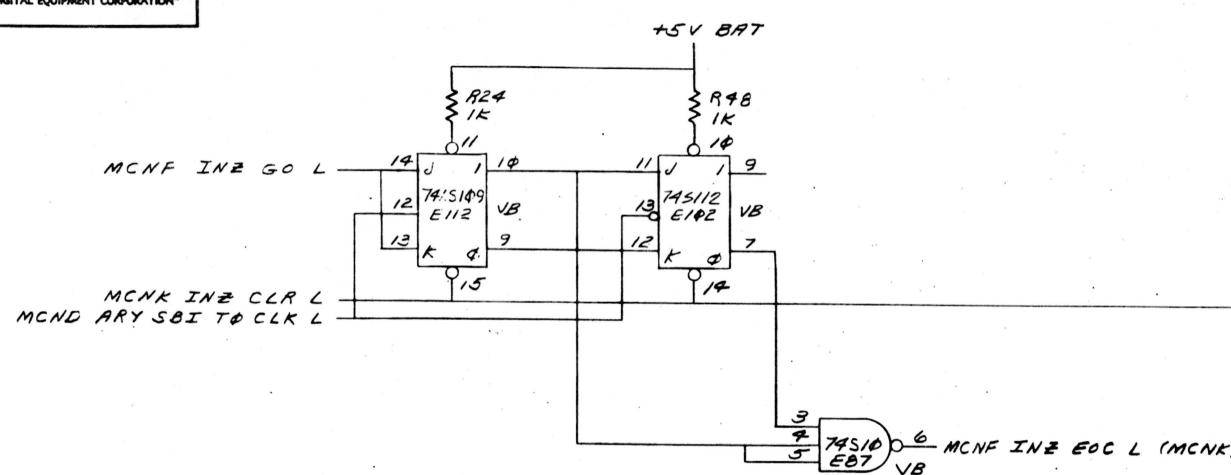
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2

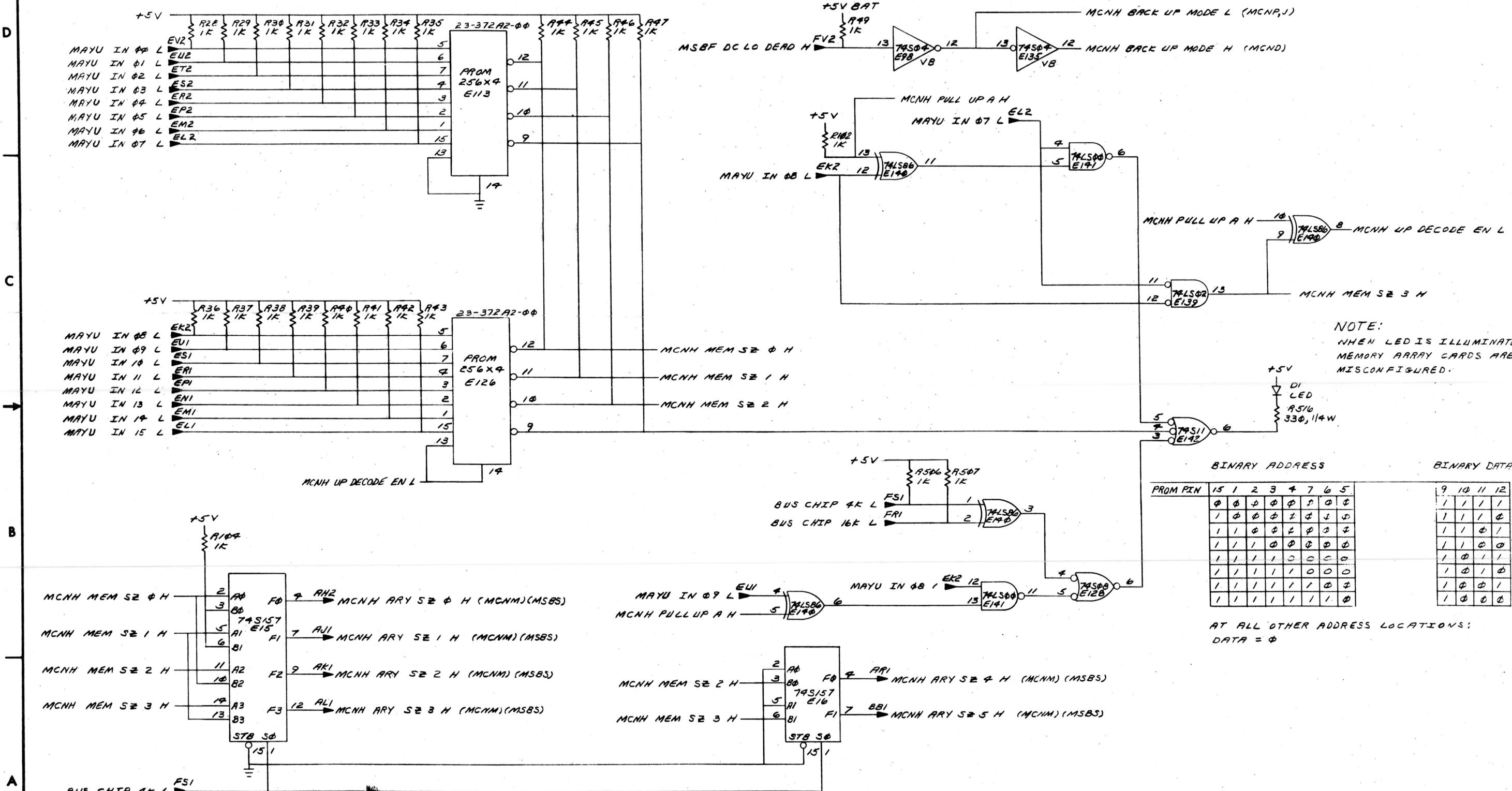
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D



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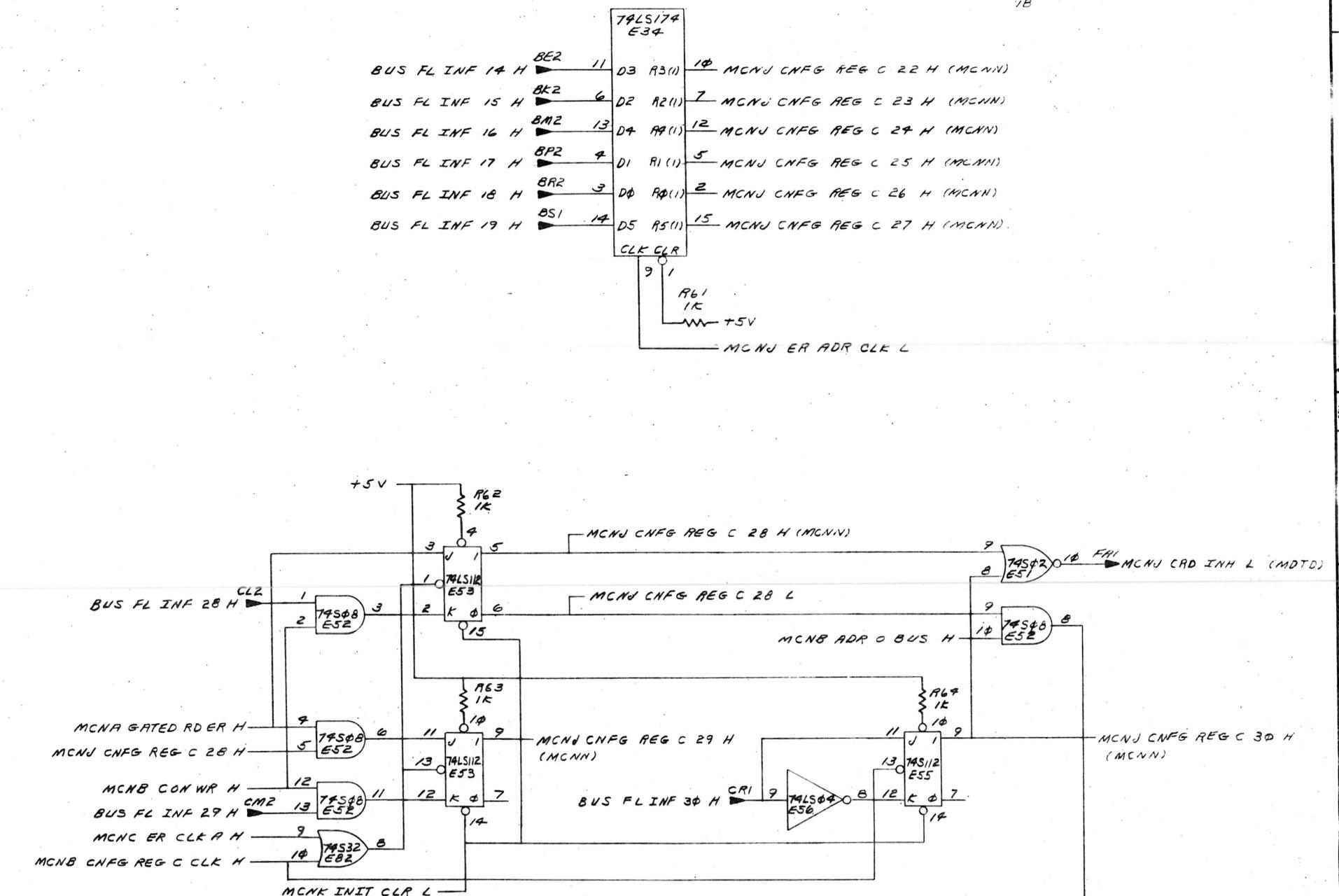
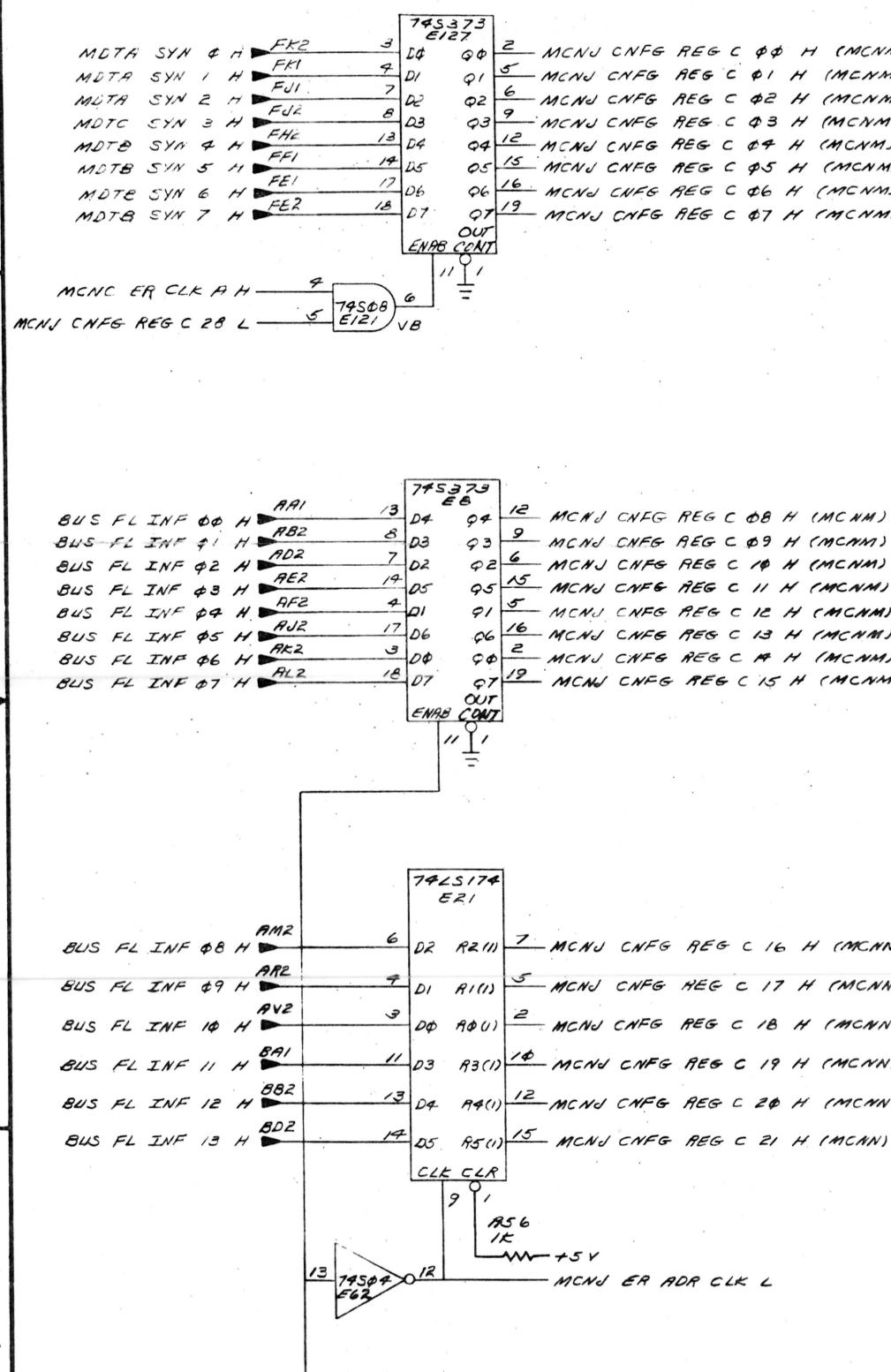


REVISIONS		
CHK	CHANGE NO.	REV.

(ARRAY SIZE & MEMORY CONFIGURATION ERROR)

TITLE	MEMORY CONTROL BOARD (MCNH)	SIZE CODE	NUMBER	REV.
SCALE	↔	SHEET	10 OF 17	DIST.

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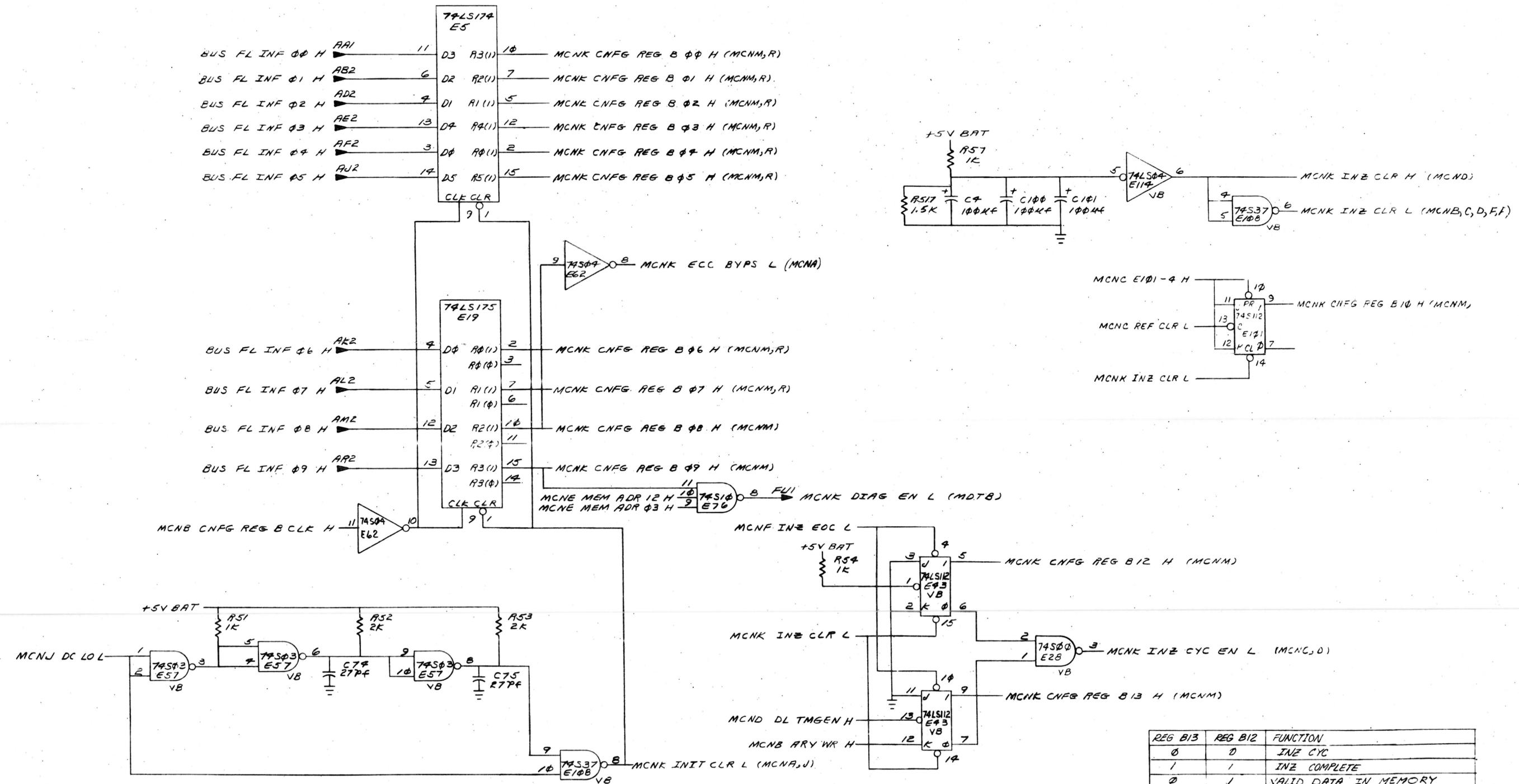
**REVISIONS**

### (CONFIGURATION C REGISTERS)

(SLOT 19)

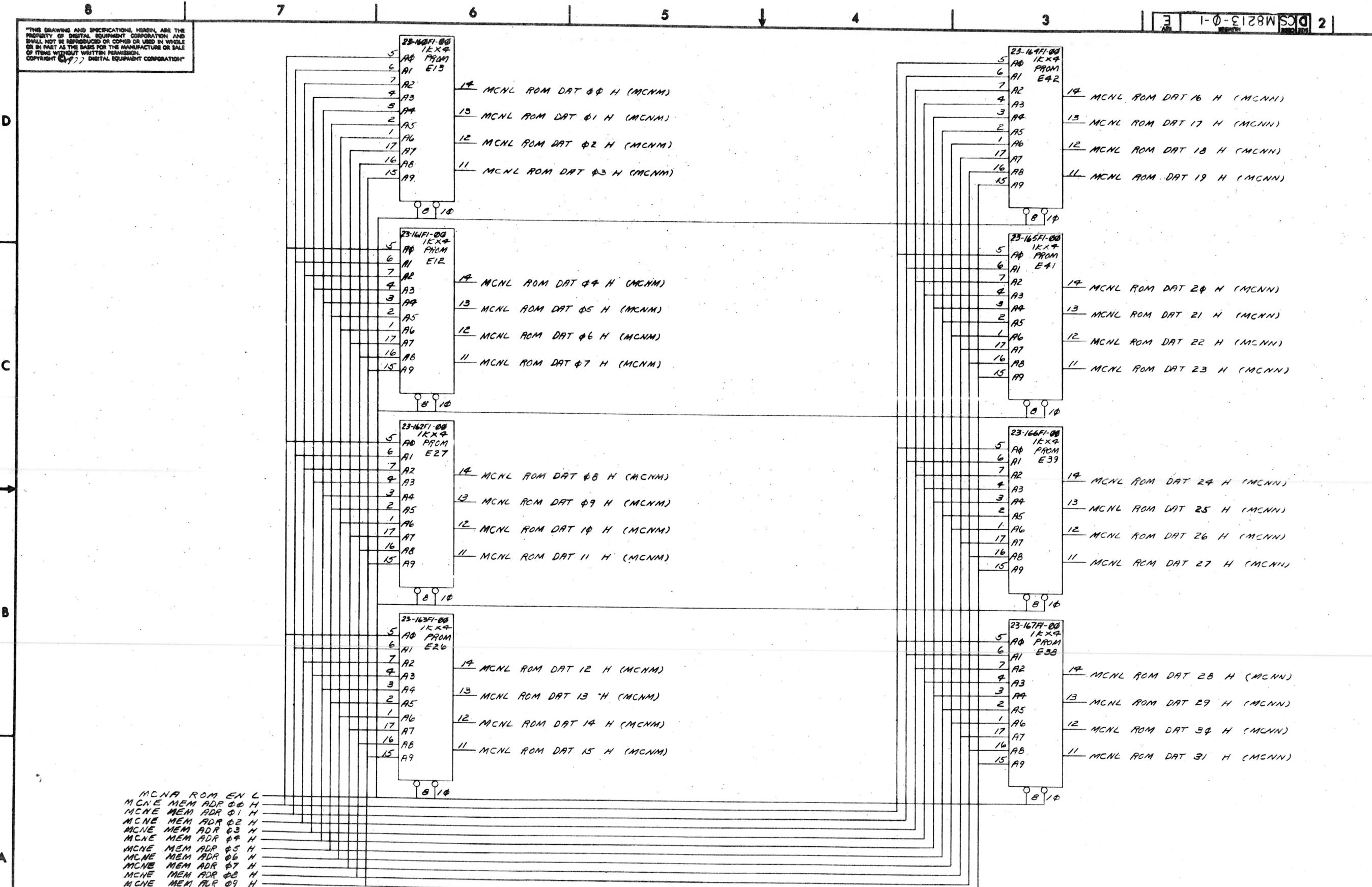
TITLE	MEMORY CONTROL BOARD (MCNJ)	SIZE CODE	NUMBER	REV.
SCALE	+ +	SHEET	11 OF 17	DIST.

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<u>REG B13</u>	<u>REG B12</u>	<u>FUNCTION</u>
0	0	INZ CYC
1	1	INZ COMPLETE
0	1	VALID DATA IN MEMORY
1	0	NOT VALID

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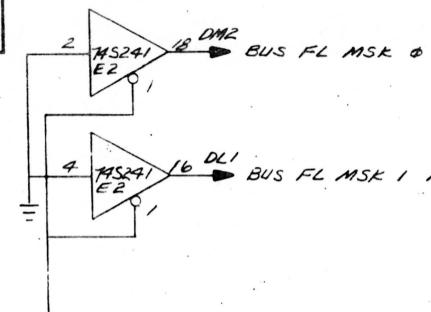
REVISIONS		
CHG	CHANGE NO.	REV.

## (ROM BOOTSTRAP)

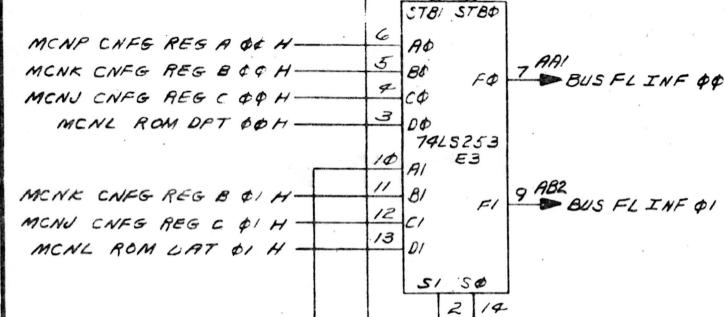
(SLOT 19)

TITLE	MEMORY CONTROL BOARD (MCNL)	SIZE CODE	NUMBER	REV.
SCALE	↔	SHEET	13 OF 17	DIST.

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MCNB MUX EN 1 L



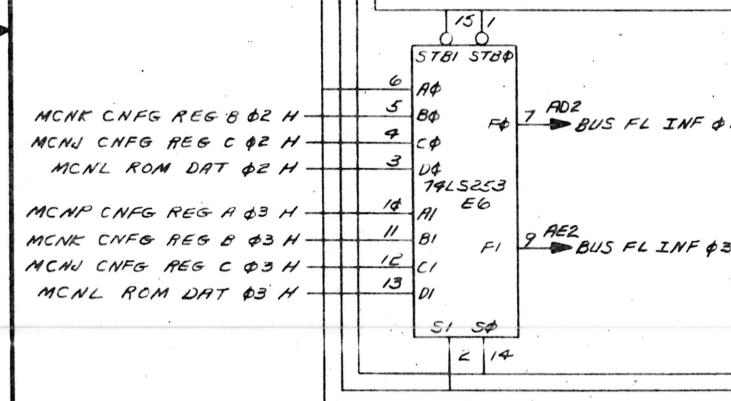
MCNP CNFG REG A 00 H  
MCNK CNFG REG B 00 H  
MCNJ CNFG REG C 00 H  
MCNL ROM DAT 00 H  
74LS253 E3  
MCNK CNFG REG B 01 H  
MCNJ CNFG REG C 01 H  
MCNL ROM DAT 01 H  
MCNB MUX SEL 1 L  
MCNB MUX SEL 2 L

MCNP CNFG REG A 04 H  
MCNK CNFG REG B 04 H  
MCNJ CNFG REG C 04 H  
MCNL ROM DAT 04 H  
74LS253 E7  
MCNK CNFG REG B 05 H  
MCNJ CNFG REG C 05 H  
MCNL ROM DAT 05 H

MCNK CNFG REG B 08 H  
MCNJ CNFG REG C 08 H  
MCNL ROM DAT 08 H  
74LS253 E24  
MCNH ARY SE 0 H  
MCNK CNFG REG B 09 H  
MCNJ CNFG REG C 09 H  
MCNL ROM DAT 09 H

MCNK CNFG REG B 12 H  
MCNJ CNFG REG C 12 H  
MCNL ROM DAT 12 H  
74LS253 E25  
MCNH ARY SE 4 H  
MCNK CNFG REG B 13 H  
MCNJ CNFG REG C 13 H  
MCNL ROM DAT 13 H

MCNH ARY SE 3 H  
MCNK CNFG REG B 12 H  
MCNJ CNFG REG C 12 H  
MCNL ROM DAT 12 H  
74LS253 E25  
MCNH ARY SE 4 H  
MCNK CNFG REG B 13 H  
MCNJ CNFG REG C 13 H  
MCNL ROM DAT 13 H  
MCNB MUX SEL 1 L  
MCNB MUX SEL 2 L



MCNK CNFG REG B 02 H  
MCNJ CNFG REG C 02 H  
MCNL ROM DAT 02 H  
74LS253 E6  
MCNP CNFG REG A 03 H  
MCNK CNFG REG B 03 H  
MCNJ CNFG REG C 03 H  
MCNL ROM DAT 03 H  
MCNB MUX SEL 1 L  
MCNB MUX SEL 2 L

MCNK CNFG REG B 06 H  
MCNJ CNFG REG C 06 H  
MCNL ROM DAT 06 H  
74LS253 E20  
MCNK CNFG REG B 07 H  
MCNJ CNFG REG C 07 H  
MCNL ROM DAT 07 H  
MCNB MUX SEL 1 L  
MCNB MUX SEL 2 L

MCNH ARY SE 1 H  
MCNK CNFG REG B 10 H  
MCNJ CNFG REG C 10 H  
MCNL ROM DAT 10 H  
74LS253 E22  
MCNH ARY SE 2 H  
MCNK CNFG REG B 11 H  
MCNJ CNFG REG C 11 H  
MCNL ROM DAT 11 H  
MCNB MUX SEL 1 L  
MCNB MUX SEL 2 L

MCNH ARY SE 5 H  
MCNK CNFG REG C 14 H  
MCNL ROM DAT 14 H  
74LS253 E23  
MCNP CNFG REG B 15 H  
MCNJ CNFG REG C 15 H  
MCNL ROM DAT 15 H  
MCNB MUX SEL 1 L  
MCNB MUX SEL 2 L

74LS253 FUNCTION TABLE

SELECT INPUTS B A	DATA INPUTS				OUTPUT CONTROL G	OUTPUT Y
	C0	C1	C2	C3		
L L	X	X	X	X	L	L/H
L H	X	X	X	X	L	L/H
H L	X	X	X	X	L	L/H
H H	X	X	X	X	L	L/H

REVISIONS		
CHK	CHANGE NO.	REV.

(I/O DATA MUX)

(SLOT 19)

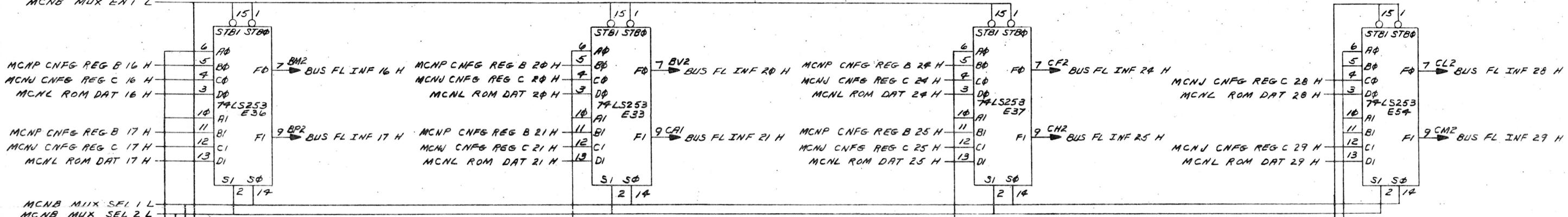
TITLE	MEMORY CONTROL BOARD (MCNM)	SIZE CODE	NUMBER
SCALE	+	SHEET	14 OF 17
DIST.			

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D

D

MCNB MUX EN1 L



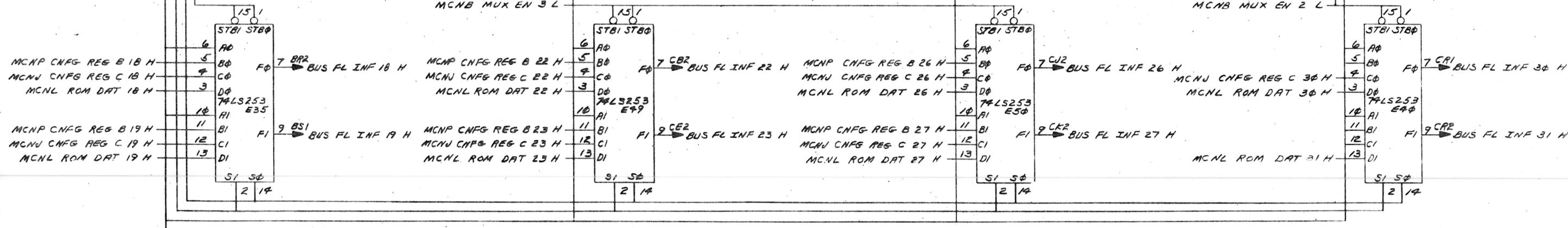
MCNB MUX SEL1 L

MCNB MUX SEL2 L

C

C

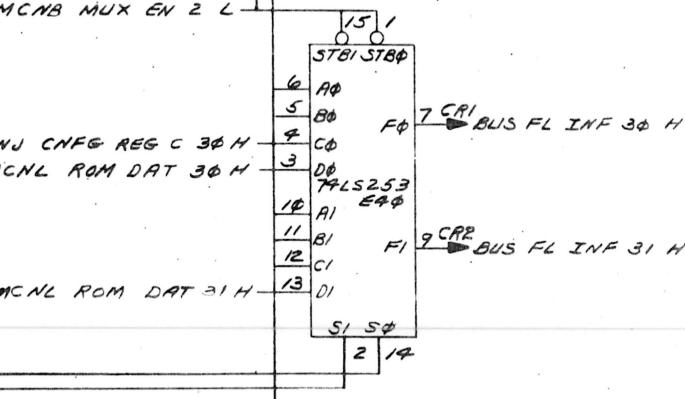
MCNB MUX EN3 L



B

B

MCNB MUX EN2 L



A

A

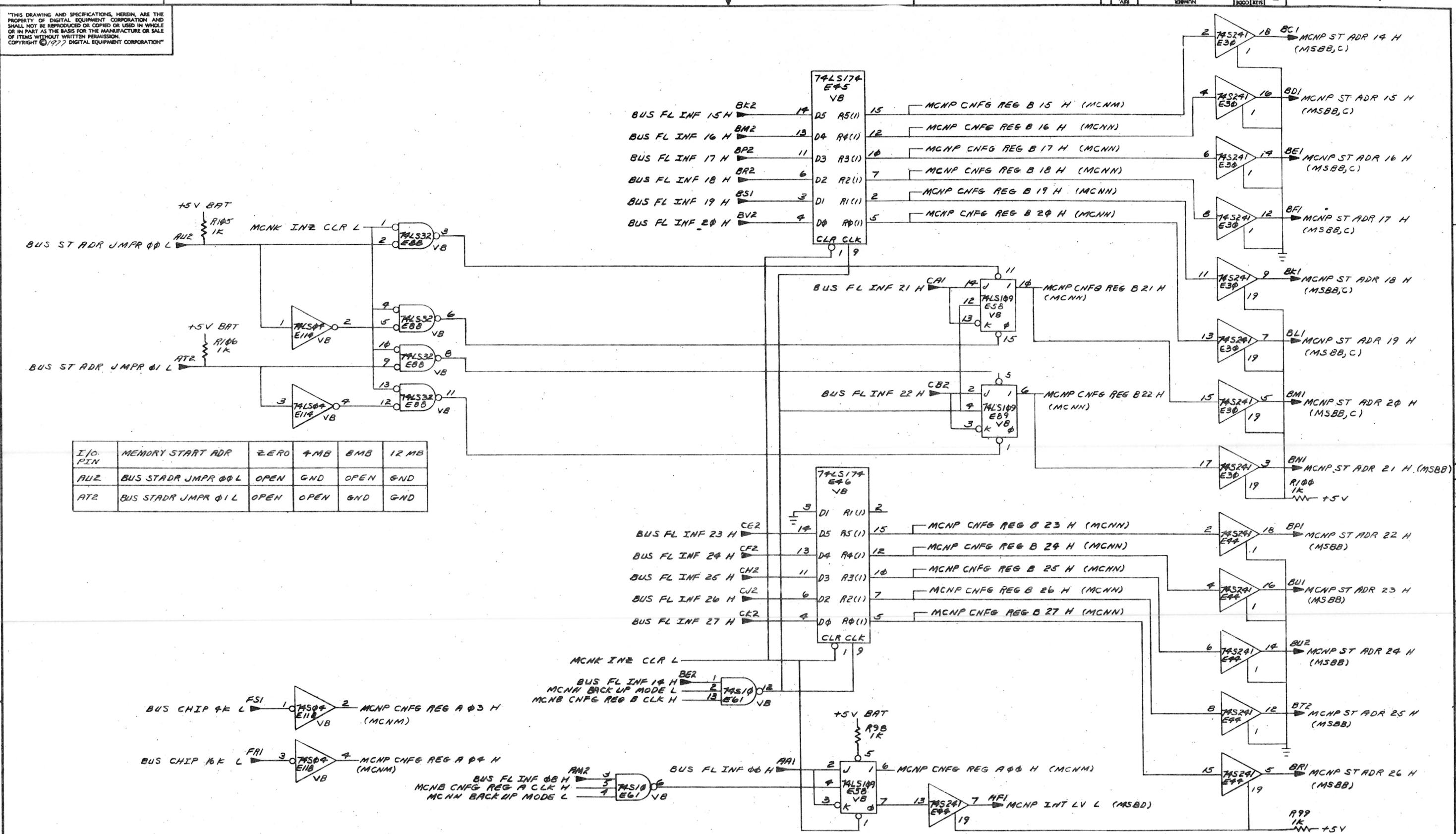
REVISIONS		
CHK	CHANGE NO.	REV.

REC FORM NO. 80G-100  
REV. 100

(I/O DATA MUX) (SLOT 19)

TITLE		SIZE CODE	NUMBER	REV.
MEMORY CONTROL BOARD (MCNN)		D CS	M8213-0-1	E
SCALE	+	SHEET	15 OF 17	DIST.

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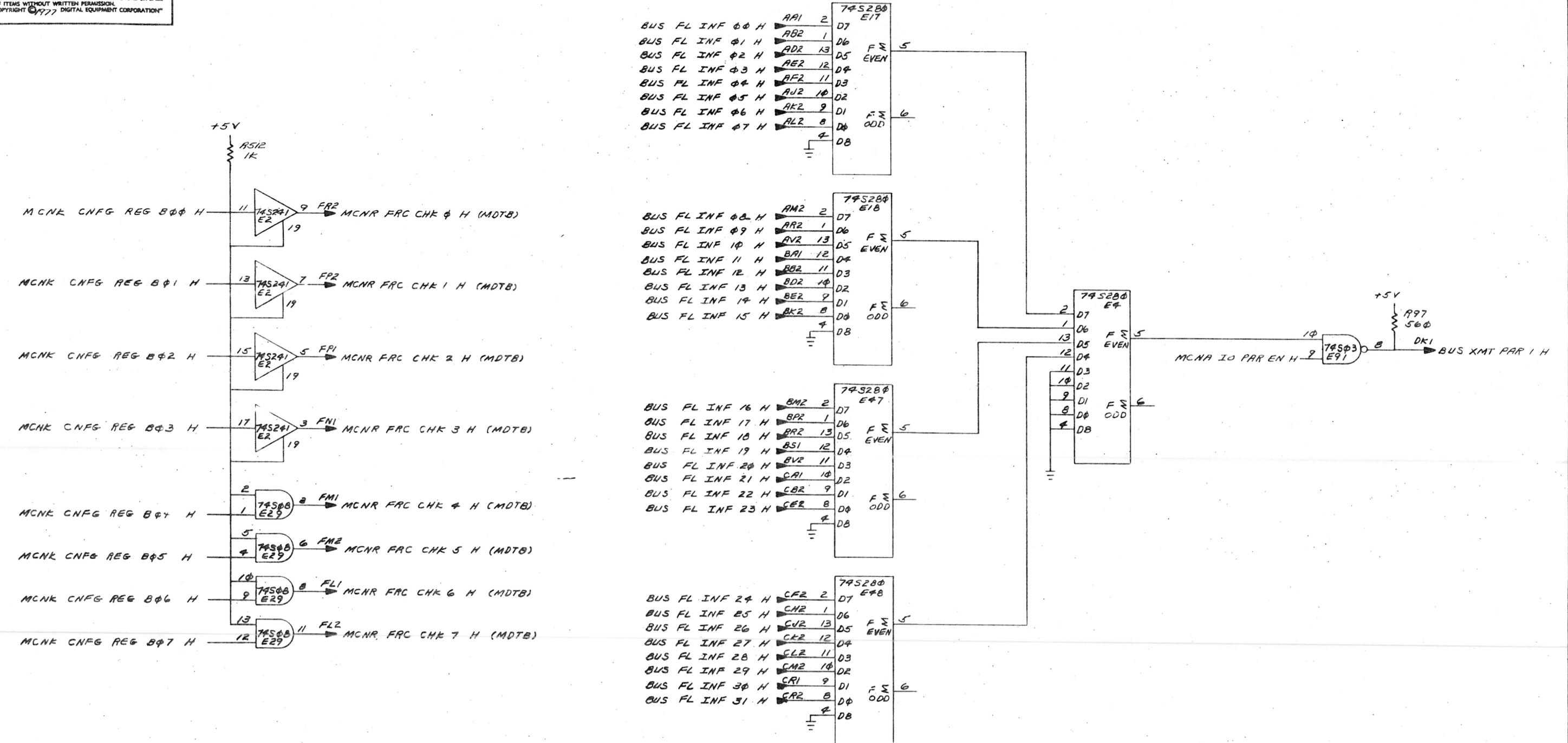


I/O PIN	MEMORY START ADR	ZERO	4MB	8MB	12M
A12	BUS STADR JMPR $\phi_0 L$	OPEN	GND	OPEN	GND
AT2	BUS STADR JMPR $\phi_1 L$	OPEN	OPEN	GND	GND

### (I/O DATA PARITY)

(SLOT 19)

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REVISIONS		
CHK	CHANGE NO.	REV.

(SLOT 19)

TITLE MEMORY CONTROL BOARD (MCNR) SIZE CODE DCS M8213-0-1 NUMBER REV. E

SCALE SHEET 17 OF 17 DIST. TW 1

REF ID: A1146

1  
COMPONENT SIDE VIEW  
J  
H  
F  
E  
D  
C  
B  
A  
J  
H  
F  
E  
D  
C  
B  
A

SIGNATURES	DATE	digital
DRA.	1/1/67	1/1/67
CHK'D & T/COPY	1/1/67	1/1/67
TECH. ENG.	1/1/67	1/1/67
PROJ. ENG.	1/1/67	1/1/67
GRD.	1/1/67	1/1/67
SIGNE	1/1/67	1/1/67
SIZE CODE	1/1/67	1/1/67
NUMBER	1/1/67	1/1/67
E U A M 8 2 1 4 - 0 0	1/1/67	1/1/67
REV. D	1/1/67	1/1/67

CHANGE NUMBER  
M8214-00-D  
1

NOTES:  
1. SPARE LOCATIONS ARE LISTED.  
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LINE ITEM	DOCUMENT NUMBER	PART NUMBER	DESCRIPTION	QTY PER VARIATION	REFERENCE DESIGNATOR
1 1	D-MD-5012451-0-0	5012451-00	M8214	1	
2 2		1011605-00	.100 MFD 10V 10% S.TANT	2	C107,C120
3 3		1012784-00	.047 MFD 50V +80-20% CER	84	C1-C12,C14-C19,C27-C37,C39-C44, C46-C51,C54,C55,C57-C60,C66-C69,
					CONT C71,C73-C75,C108,C109,C99,
					CONT C21-C25,C62-C64,C100,C77-C79,
					CONT C81-C86,C88,C90-C95,C98
4 4	BLANK			0	
5 5		1012084-01	8 MFD 25V +75-10% AL EL	7	C110,C101-C106
6 6		1103041-00	DEC 777 QS=12PCB PIV= .8VS	2	D1,D2
7 7		1216988-02	HANDLE,MODULE,HEX TWO EJECTORS	1	
8 8		1300309-00	390.0 .25 W 5.0 % CC	2	R23,R26
9 9		1300365-00	1.0 K .25 W 5.0 % CC	44	R1-R21,R24,R25,R27-R31,R43-R55, R57-R59
10 10		1300391-00	1.50 K .25 W 5.0 % CC	1	R56
11 11		13P1972-00	270.0 .25 W 5.0 % CC	11	R32-R42
12 12		1511686-00	DEC5433 FET N 350MW 10 25 1A	3	Q1-Q3
13 13		1605528-00	DELAY= 30NS,0TAPS DL5184	1	DL2
14 14		1610080-01	DELAY= 15NS,0TAPS	1	DL1
15 15		1913730-00	DC 101 PRIORITY ARBITRATOR	1	E163
16 16		1912731-00	DEC 8646A TRANSCEIVER,48BIT BUS	14	E1,E2,E16,E32,E47,E62,E76,E48, E91,E92,E105,E106,E120,E121
17 17		1913493-00	74S241 OCTAL BUFFER,TRI-STA	2	E75,E113
18 18		1910542-00	74S64 A-0-I GATE 4-2-3-2	1	E142
19 19		1910532-00	74S00 NAND GATE-QUAD 2IN	7	E31,E83,E87,E99,E117,E134,E140
20 20		1910534-00	74S04 INVERTER GATE-HEX 1I	11	E11,E12,E17,E20,E30,E38,E96, E101,E126,E141,E145
21 21		1910536-00	74S10 NAND GATE-TRIPLE 3IN	4	E46,E74,E131,E169
22 22		1910537-00	74S11 AND GATE-TRIPLE 3INP	2	E39,E109
23 23		1910539-00	74S20 NAND GATE-DUAL 4INPU	2	E44,E116

REVISION HISTORY	BASIC PART NO:	M8214	DRN:	J.FITZGERALD	DATE: 05-JUN-78	I D I I G I T ! A ! L
ENG!	ECO NUMBER	I REV	SECTION A OF A		TITLE	PARTS LIST
J,S	00002	I C	SECTION,VARIATION INDEX	I CHK'D: F.SMART	DATE: 05-JUN-78	
RC	ITW003	I D	[A] 00			MEMORY SBI BOARD
			[B]			
			[C]	I DES.ENG: P.RADO	DATE: 05-JUN-78	
			[D]			
			[E]			
			[F]	I RESP.ENG.: P.RADO	DATE: 05-JUN-78	
			[G]			
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			[K]	I MFG.ENG.: M.TERELLO	DATE: 05-JUN-78	
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			[M]	I ASSEMBLY NUMBER:	TOP DOCUMENT NUMBER:	FILE NAME:
			[N]	ID-UA-M8214-0-0	M8214	Z1282D,PLS
						EDIT # 9

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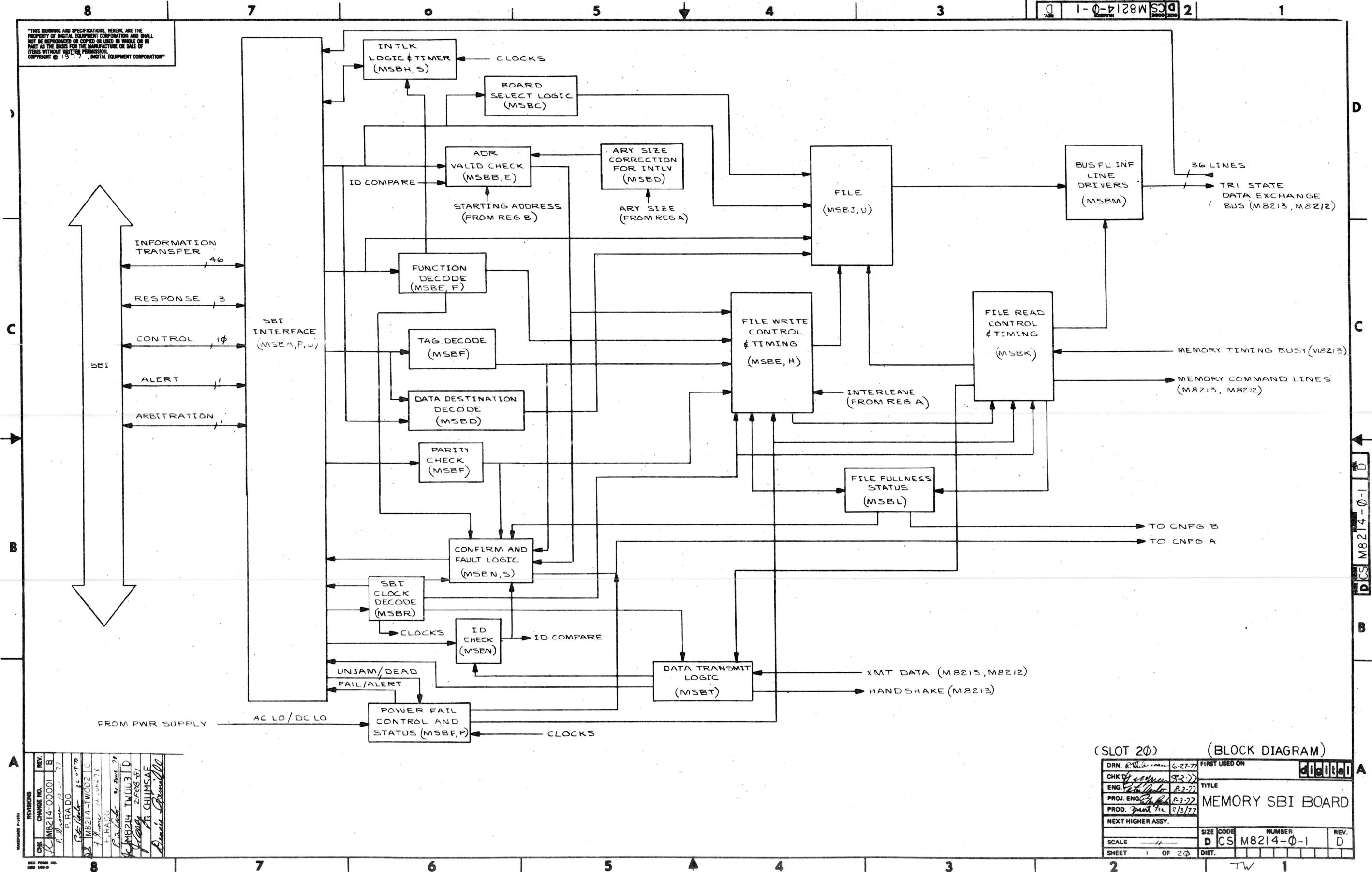
## PARTS LIST

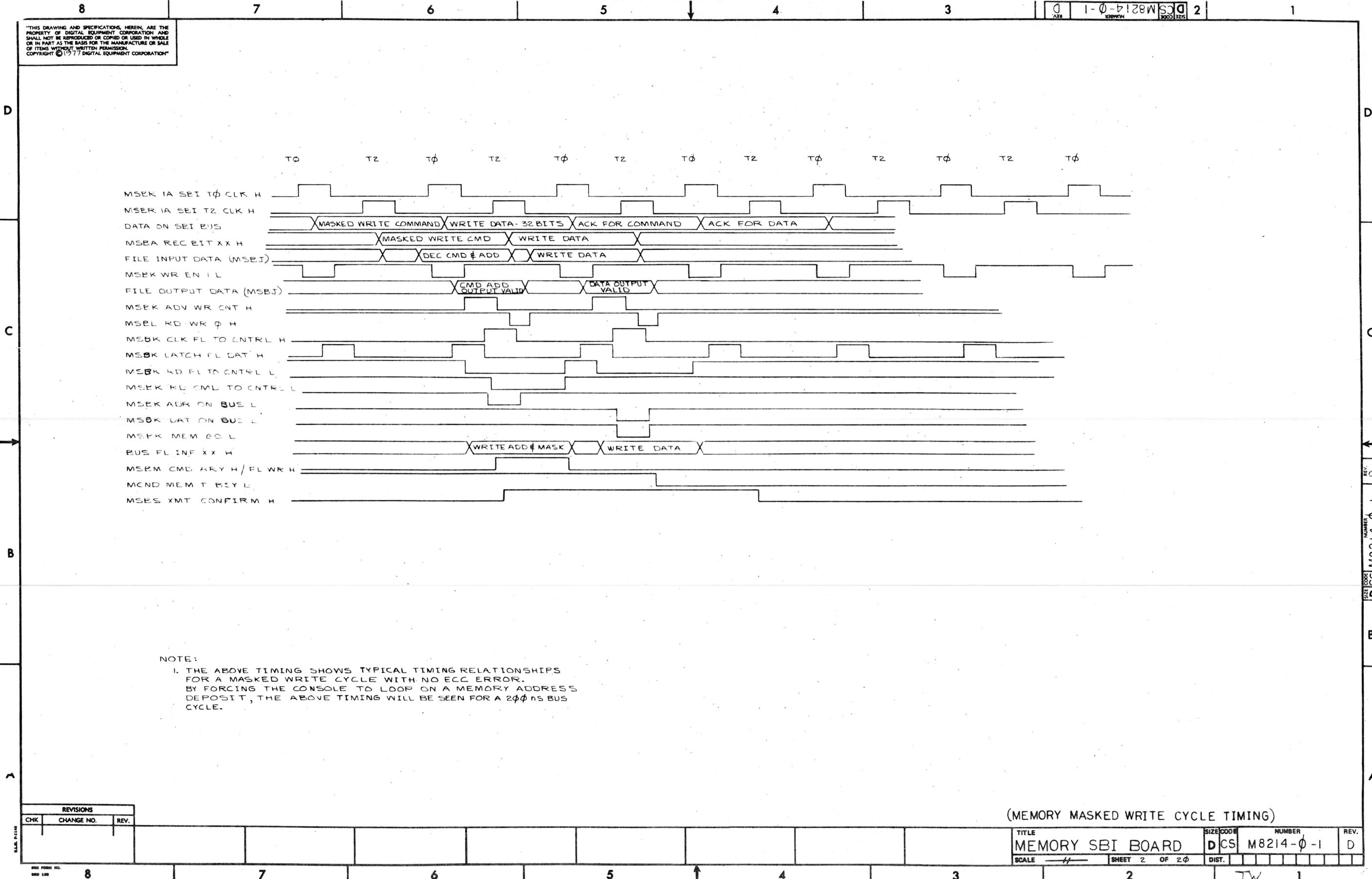
SHEET A2 OF A2

LINE ITEM	DOCUMENT NUMBER	PART NUMBER	DESCRIPTION	QTY PER VARIATION	REFERENCE DESIGNATOR
24	24	1910545-00	74S112 FF-JK DUAL,EDGE TRIG	7	E13,E14,E68,E81,E146,E147,E154
25	25	1910546-00	74S140 NAND GATE-DUAL 4INPU	1	E82
26	26	1910550-00	74S174 FF-D HEX	2	E61,E150
27	27	1910650-00	74161 COUNTER,SYNCHR. UP	2	E158,E159
28	28	1910544-00	74S74 FF-D DUAL,EDGE TRIGG	10	E69,E70,E84,E95,E110,E123,E148, CONT E157,E165,E167
29	29	1911398-00	10101 OR/NOR GATE,4-2IN	1	E137
30	30	1911415-00	10125 ECL TO TTL TRNSLTR	3	E122,E138,E151
31	31	1911469-00	DEC 8640 RECEIVER,BUS,QUAD,U	1	E127
32	32	1911573-00	74S280 PARITY GEN/CHKR,9BIT	3	E60,E98,E112
33	33	1911641-00	SN 74S257 MUX,QUAD 2 TO 1	2	E23,E22
34	34	1911675-00	74S138 DECODER/DEMUX 3-8 LIN	3	E88,E89,E100
35	35	1911712-00	74S51 AND-OR GATE-INVERT D	3	E7,E168,E80
36	36	1911983-00	74S133 NAND GATE-POSITIVE 1	6	E59,E73,E86,E103,E124,E139
37	37	1912089-00	74S85 CMPRTR-4BIT MAGNITUD	4	E43,E51,E53,E111
38	38	1912096-00	DEC 74S86 XOR GATE,QUAD 2IN	3	E29,E65,E128
39	39	1912388-00	74S02 NOR GATE-QUAD 2IN,PO	5	E28,E102,E115,E133,E153
40	40	1912389-00	74S08 AND GATE-QUAD 2IN,PO	7	E27,E90,E107,E149,E155,E156,E165
41	41	1912656-00	LS670 REGISTER FILE,4X4,LO	13	E8-E10,E24-E26,E40-E42,E54-E57
42	42	1912746-00	DEC 74S37 NAND GATE-QUAD 2IN	2	E97,E118
43	43	1912799-00	LS00 NAND-GATE-QUAD 2IN,P	1	E58
44	44	1912801-00	LS02 NOR-GATE-QUAD 2IN	3	E45,E71,E72
45	45	1912810-00	LS20 NAND GATE-DUAL 4IN	1	E104
46	46	1912828-00	LS85 COMPARATOR,4BIT MAGN	7	E35,E49,E52,E63,E66,E85,E67
47	47	1913887-00	74S258 MUX 1 OF 2(QUAD)TRI	3	E18,E19,E37
48	48	1912865-00	LS283 ADDER-4BIT BINARY FU	5	E21,E36,E50,E64,E114
49	49	1913220-00	10216 RECEIVER,TRIPLE LINE	1	E136
50	50	1913294-00	93S16 COUNTER,SYNCH UP 8IN	3	E129,E143,E144
51	51	1913340-00	74S32 OR GATE-QUAD 2IN	5	E119,E125,E130,E152,E132
52	52	1913670-00	74S373 LATCH 8BIT TRASP TR	6	E77-E79,E93,E94,E108
53	53	1912847-00	LS157 MUX 1 OF 2(QUAD)	6	E3-E6,E33,E34
54	54	9000024-01	EYELET, ROLLED FLANGE, .121 OD X	12	
55	55	9008864-00	TAPE, DOUBLE COATED, 3/8" WIDE X A/R	0	
56	56	BLANK			

57 NOTE: E15,E135,E160-E162,E170-E173,E164 ARE SPARE I.C.'S

D	I	G	I	T	A	L	TITLE	SIZE	CODE	DOCUMENT NUMBER	REV
!	!	!	!	!	!	!	MEMORY SBI BOARD	!	!	!	!





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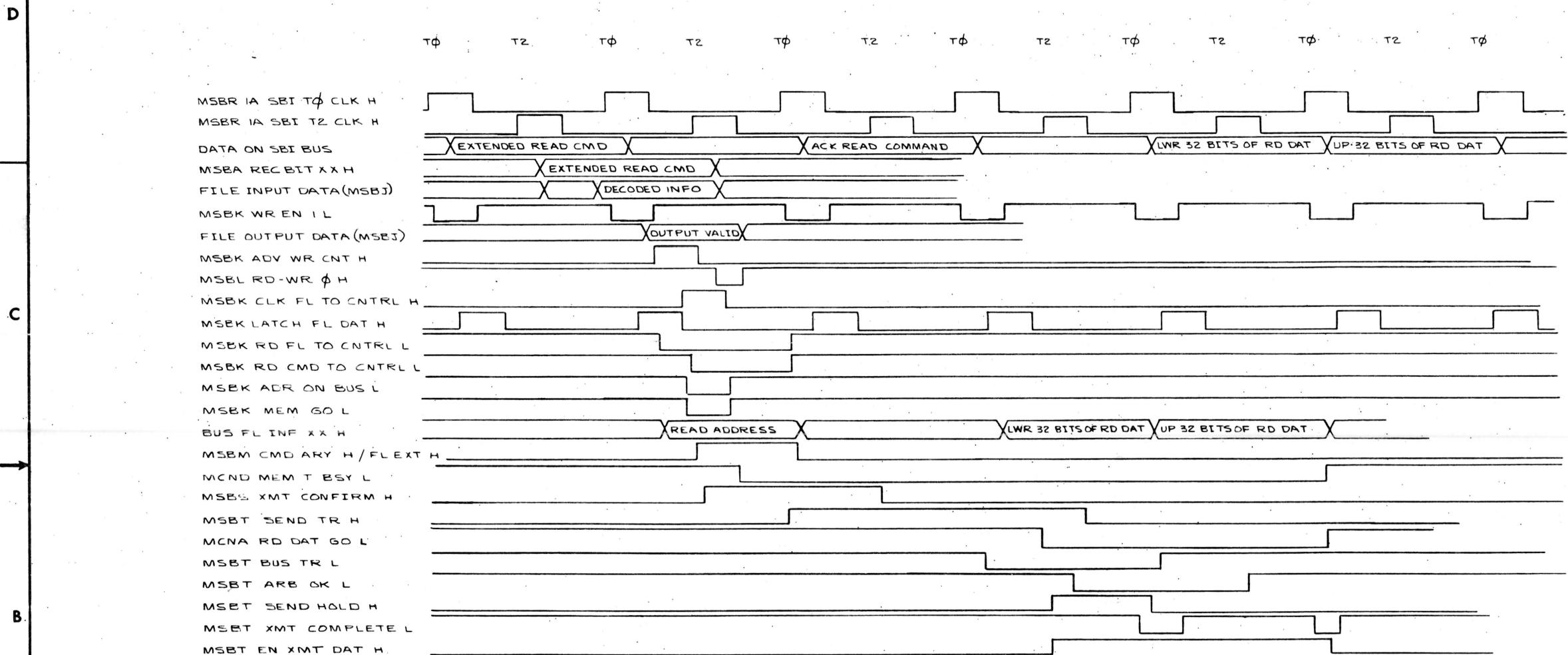
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## NOTE:

1. THE ABOVE TIMING SHOWS TYPICAL TIMING RELATIONSHIPS FOR AN EXTENDED READ CYCLE WITH NO ECC ERROR. BY FORCING THE CONSOLE TO LOOP ON A MEMORY ADDRESS EXAMINE AND SUPPRESSING TERMINAL PRINTOUT. THE ABOVE TIMING WILL BE SEEN FOR A 2φφ ns BUS CYCLE  
BE SURE TO BYPASS THE CACHE (D/I D 18φφφ)

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REVISIONS		
CHK	CHANGE NO.	REV.

## (MEMORY EXTENDED READ CYCLE TIMING)

TITLE	SIZE/CODE	NUMBER	REV.
MEMORY SBI BOARD	D	CS M8214-0-1	D
SCALE	1	SHEET 3 OF 20	DIST.

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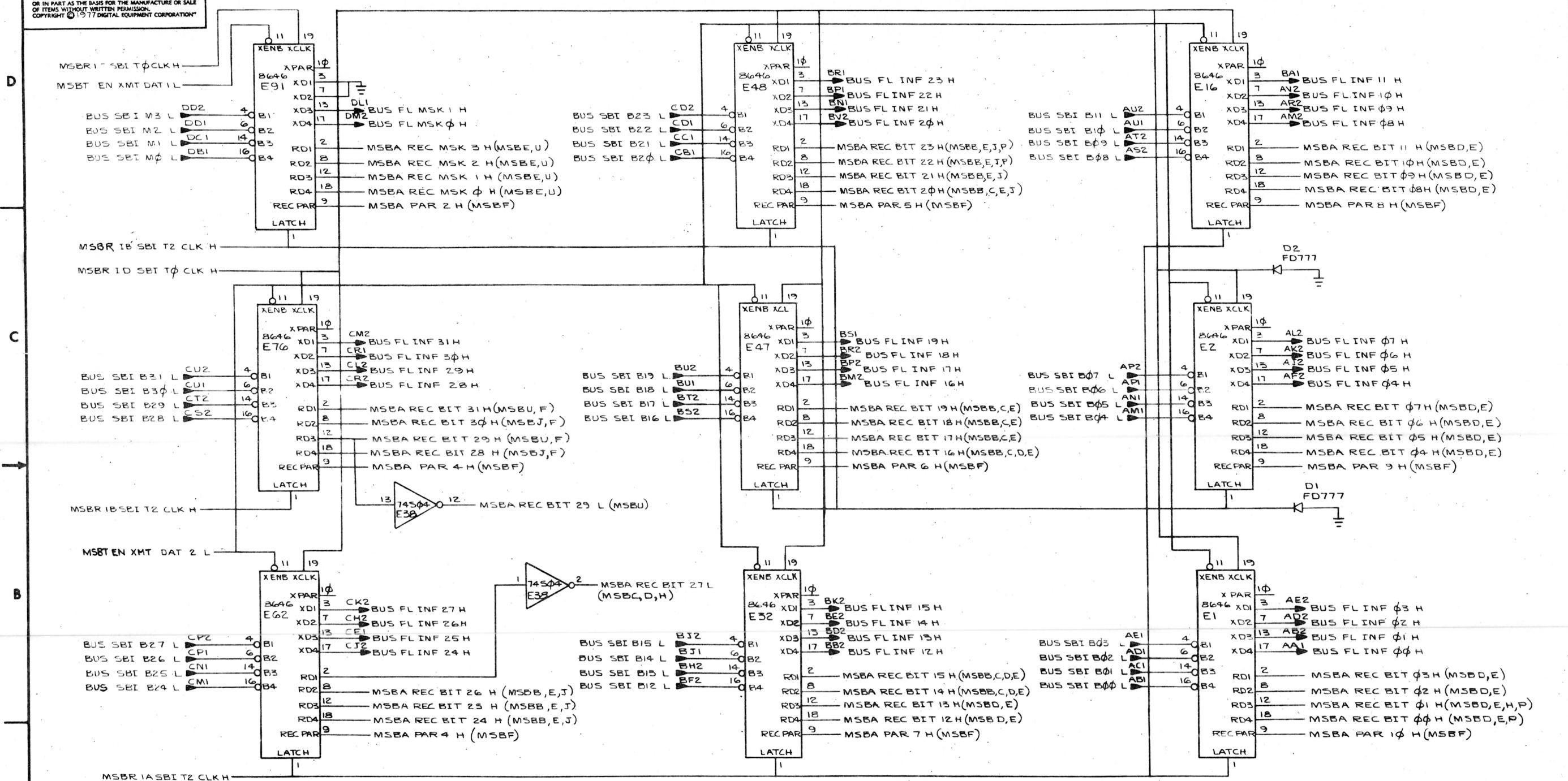
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**REVISIONS**

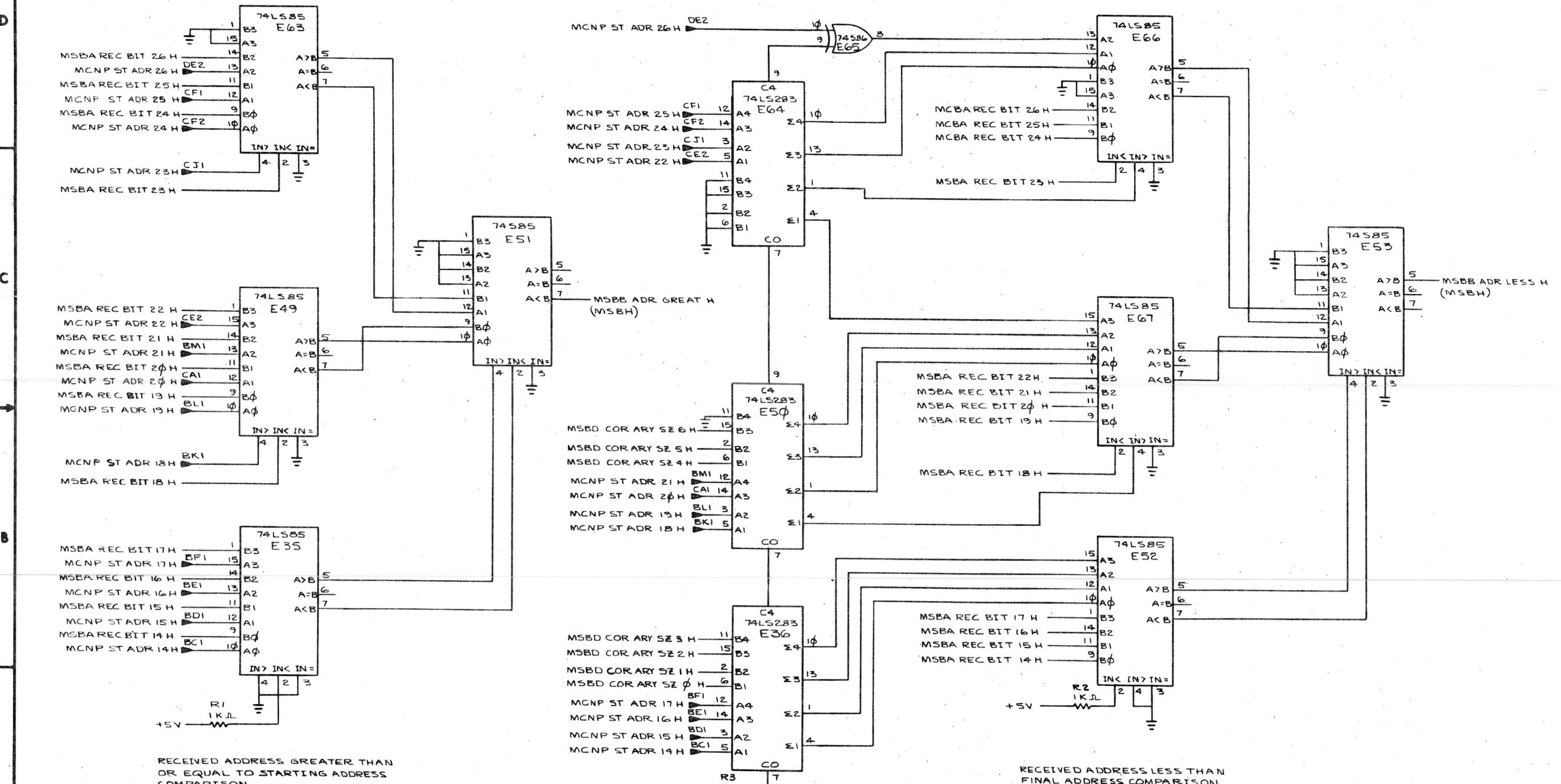
(SBI INTERFACE CHIPS)

(SLOT 2Ø)

TITLE	(MSBA)	SIZE CODE	NUMBER	REV.
<b>MEMORY SBI BOARD</b>	D CS	M8214-0-1		D
SCALE	11	SHOOT	OF 20	DISY.

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CHK	CHANGE NO.	REV.

(ARRAY ADDRESS DECODE)			(SLOT 20)
TITLE			REF. CODE
MEMORY SBI BOARD (MSBB)			D CS M8214-0-1
SCALE	INCHES	SHEET 5 OF 20	INCHES



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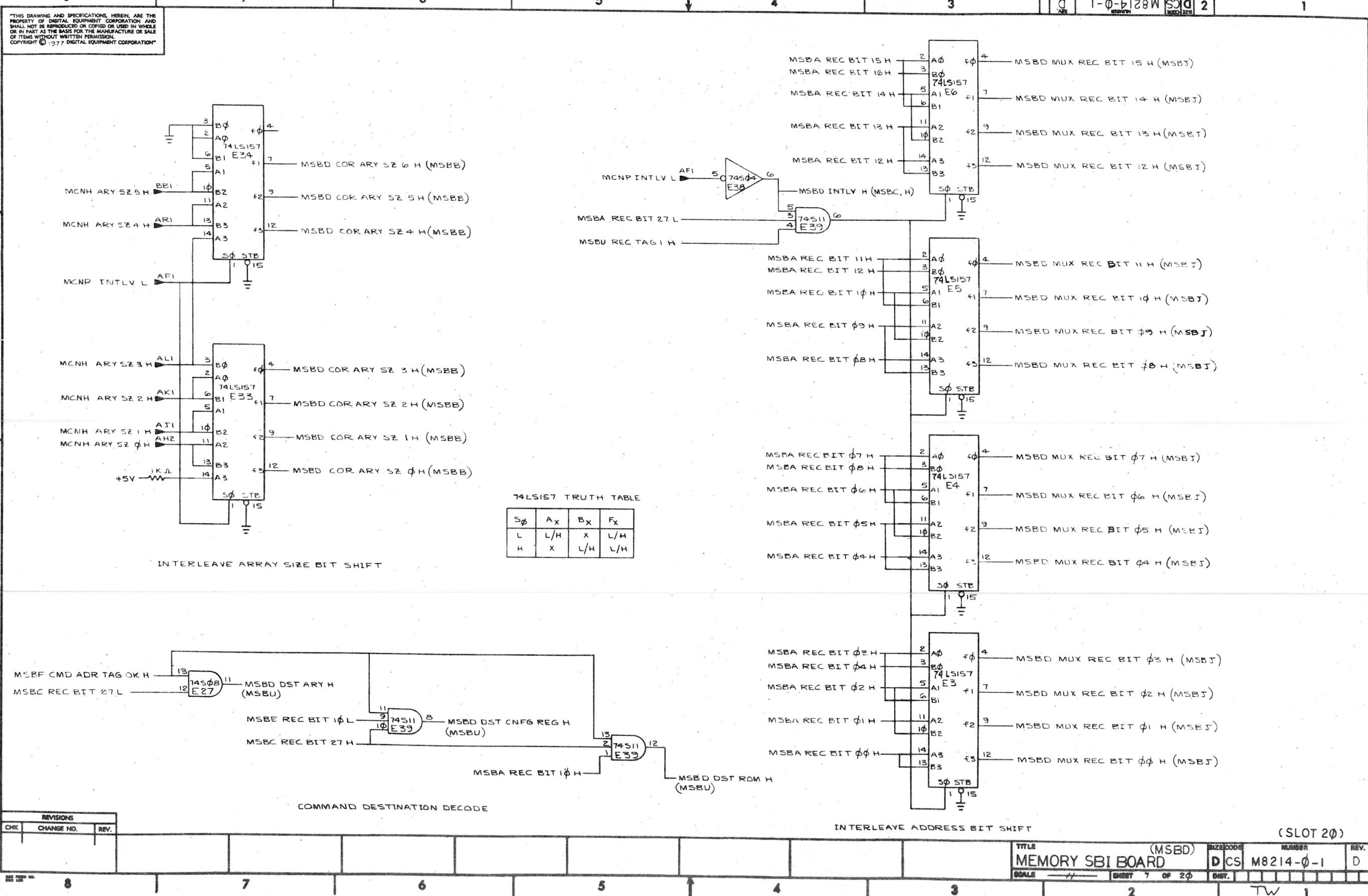
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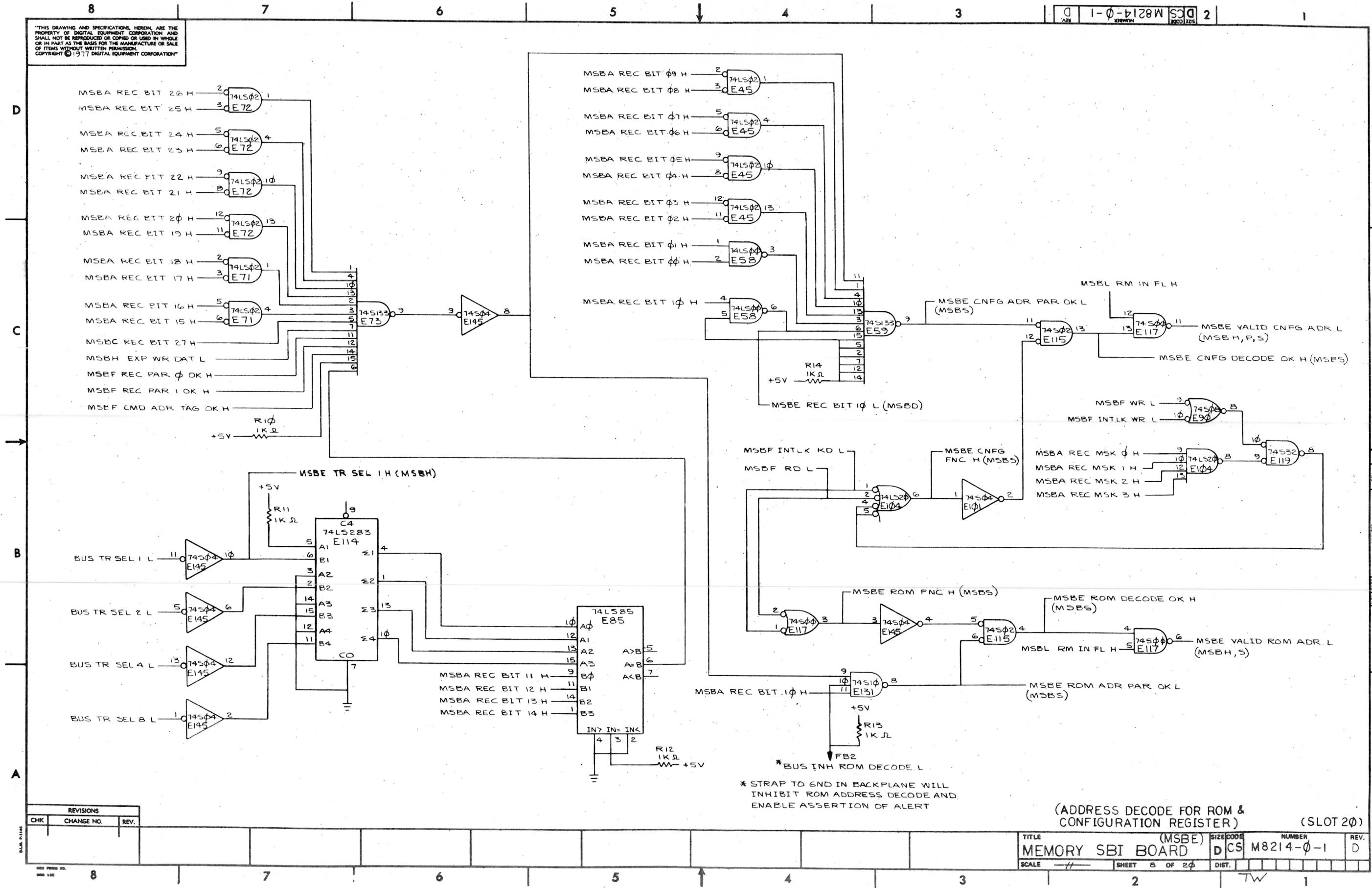
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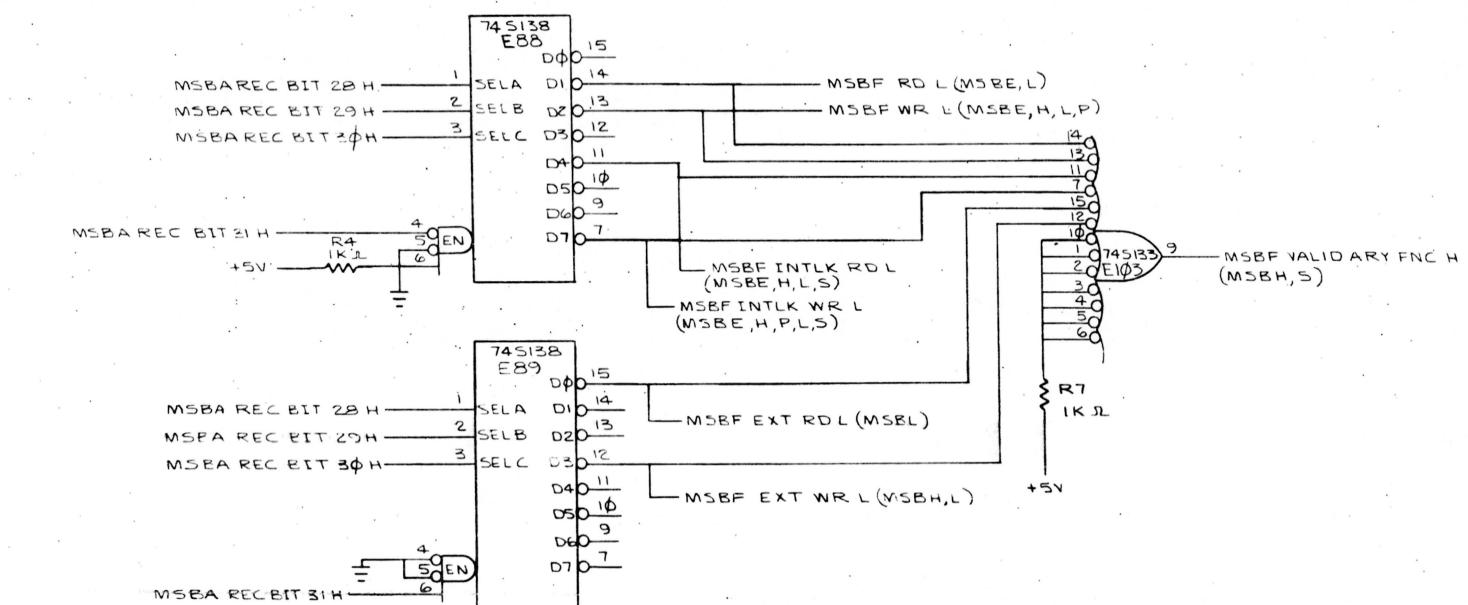
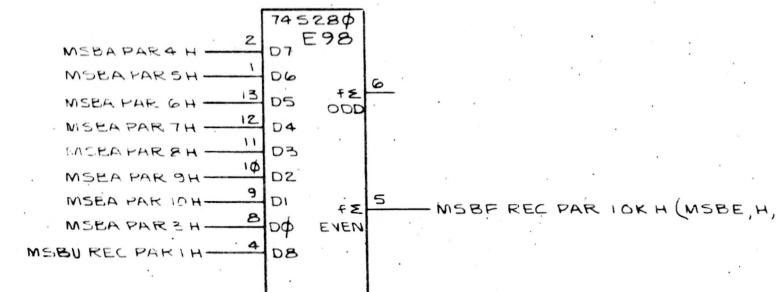
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DCS M8214-0-1

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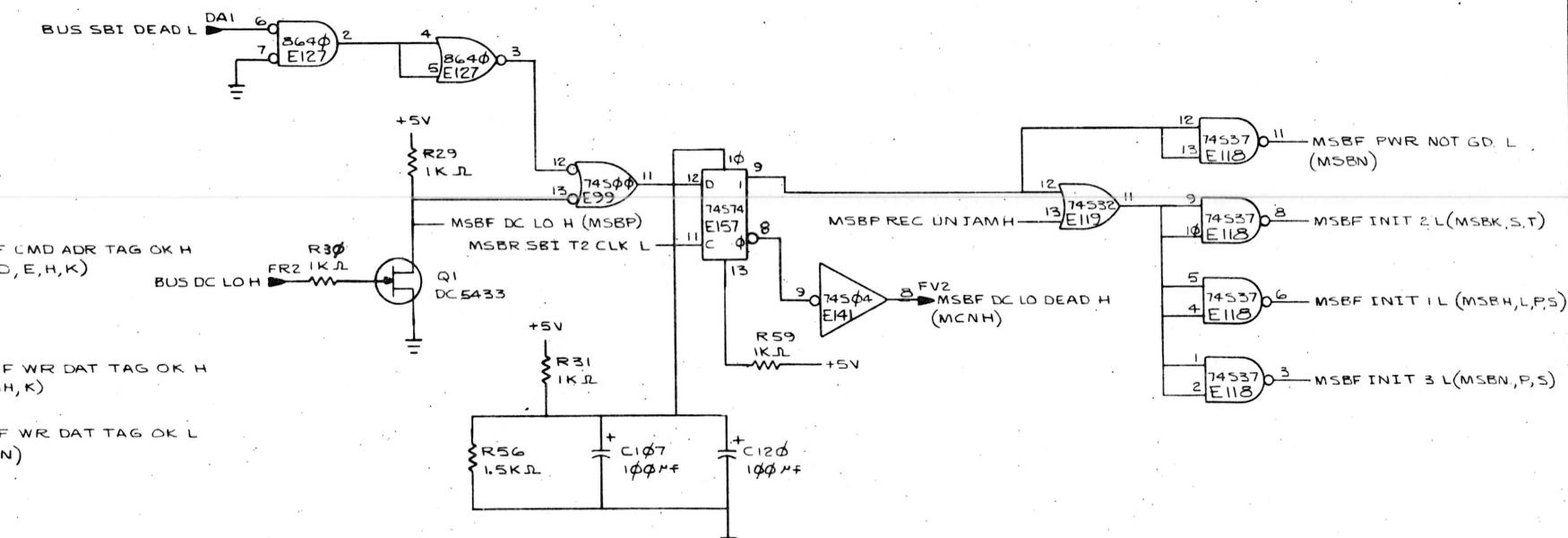
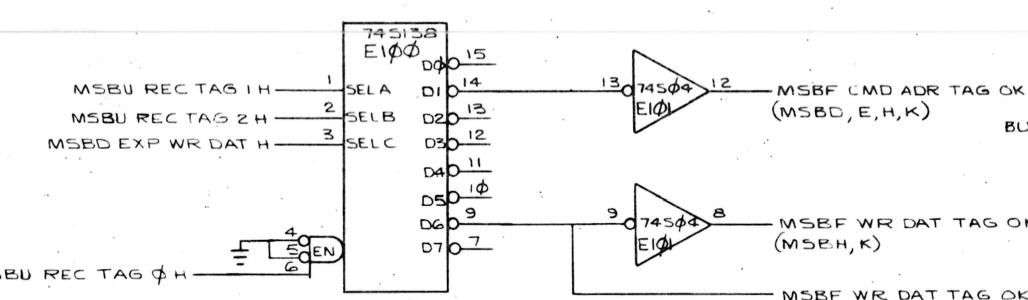
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RECEIVED FUNCTION VALIDATION

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RECEIVED DATA PARITY CHECK



INITIALIZATION CIRCUITRY

(SLOT 20)

REVISIONS		
CHK	CHANGE NO.	REV.

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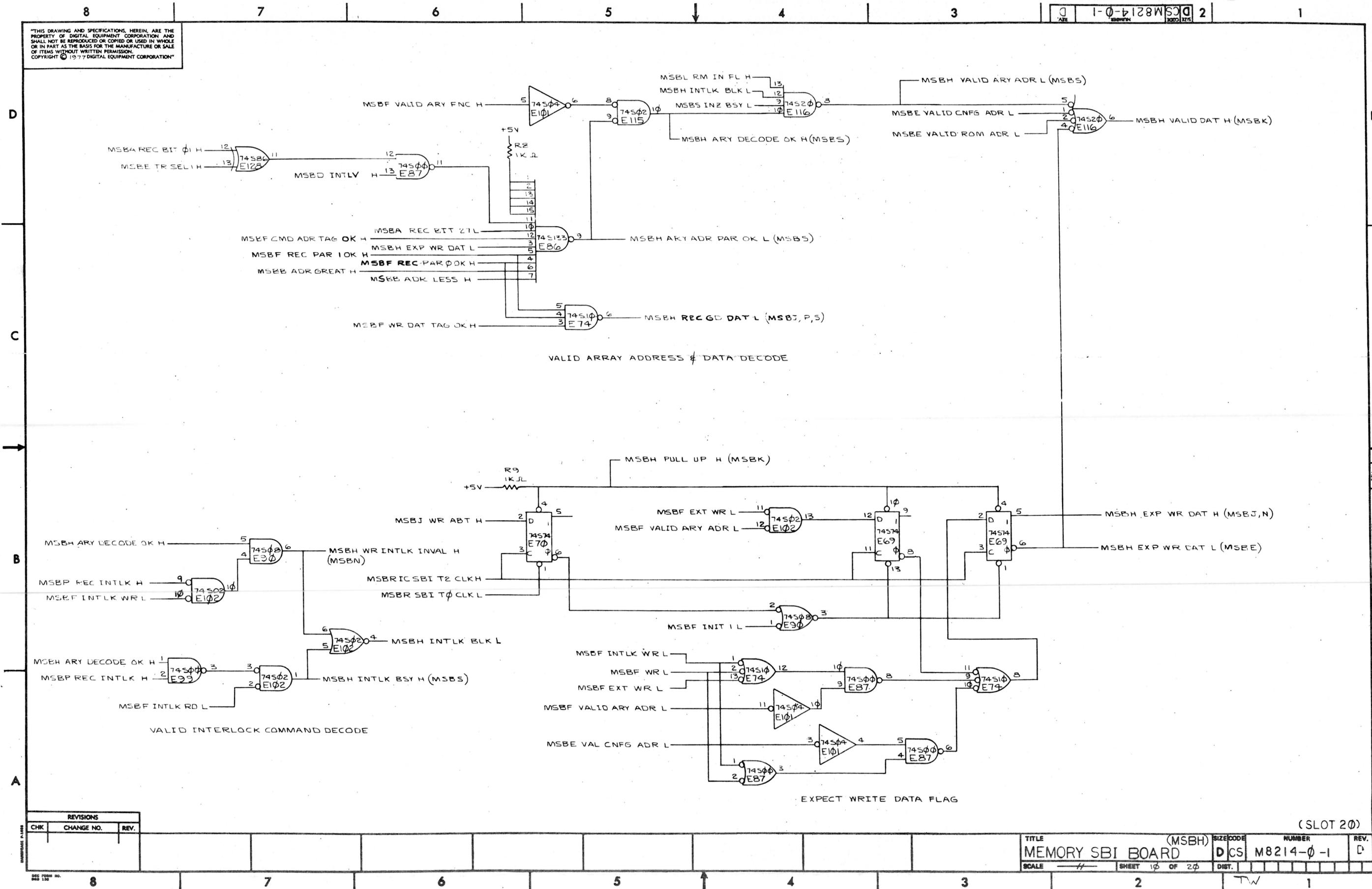
DCS M8214-0-1

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REV.

TITLE (MSBF) SIZE CODE DCS M8214-0-1 NUMBER 1 REV. D

SCALE -/- SHEET 3 OF 20 DIST. 1 TW 1



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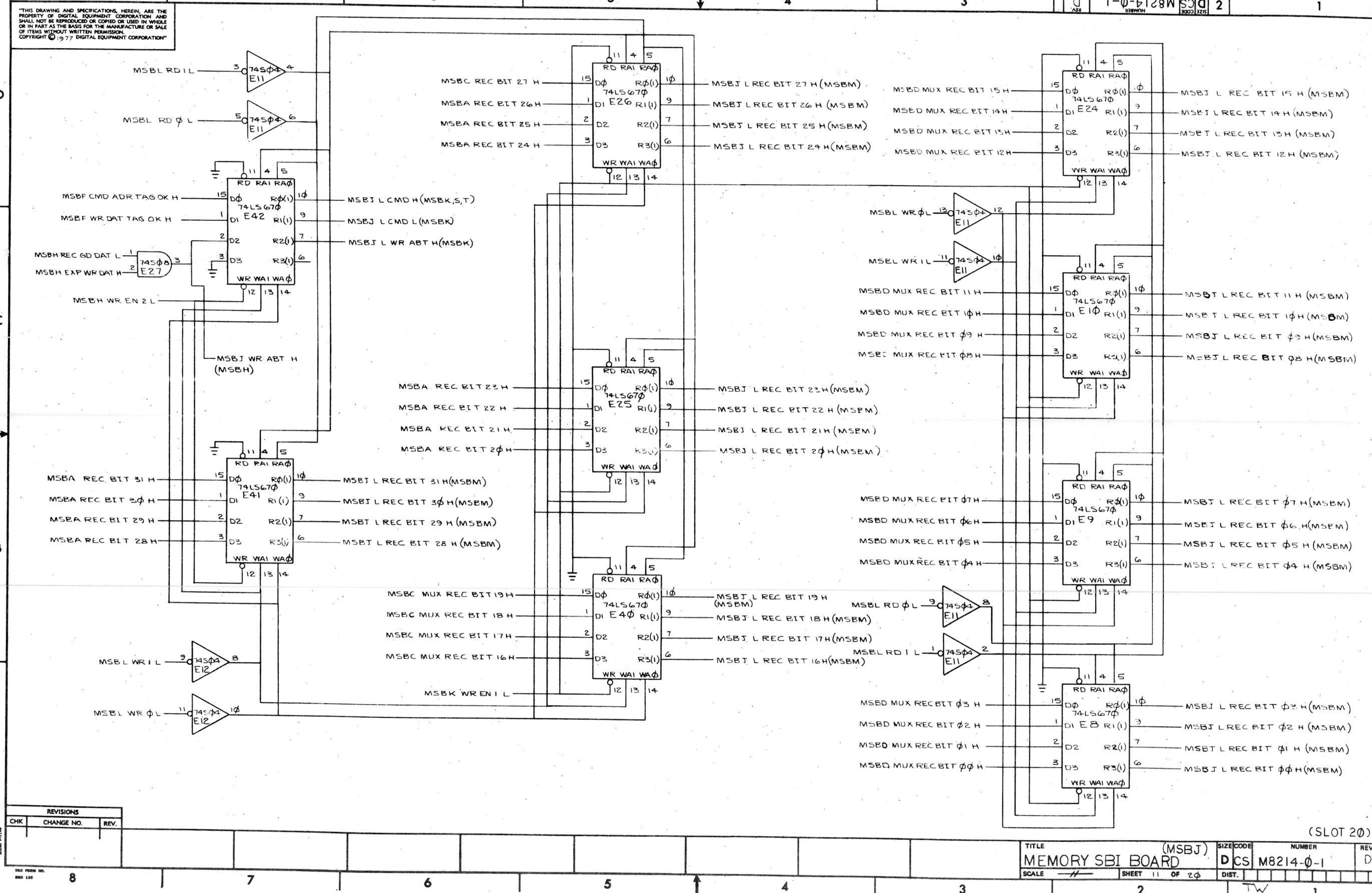
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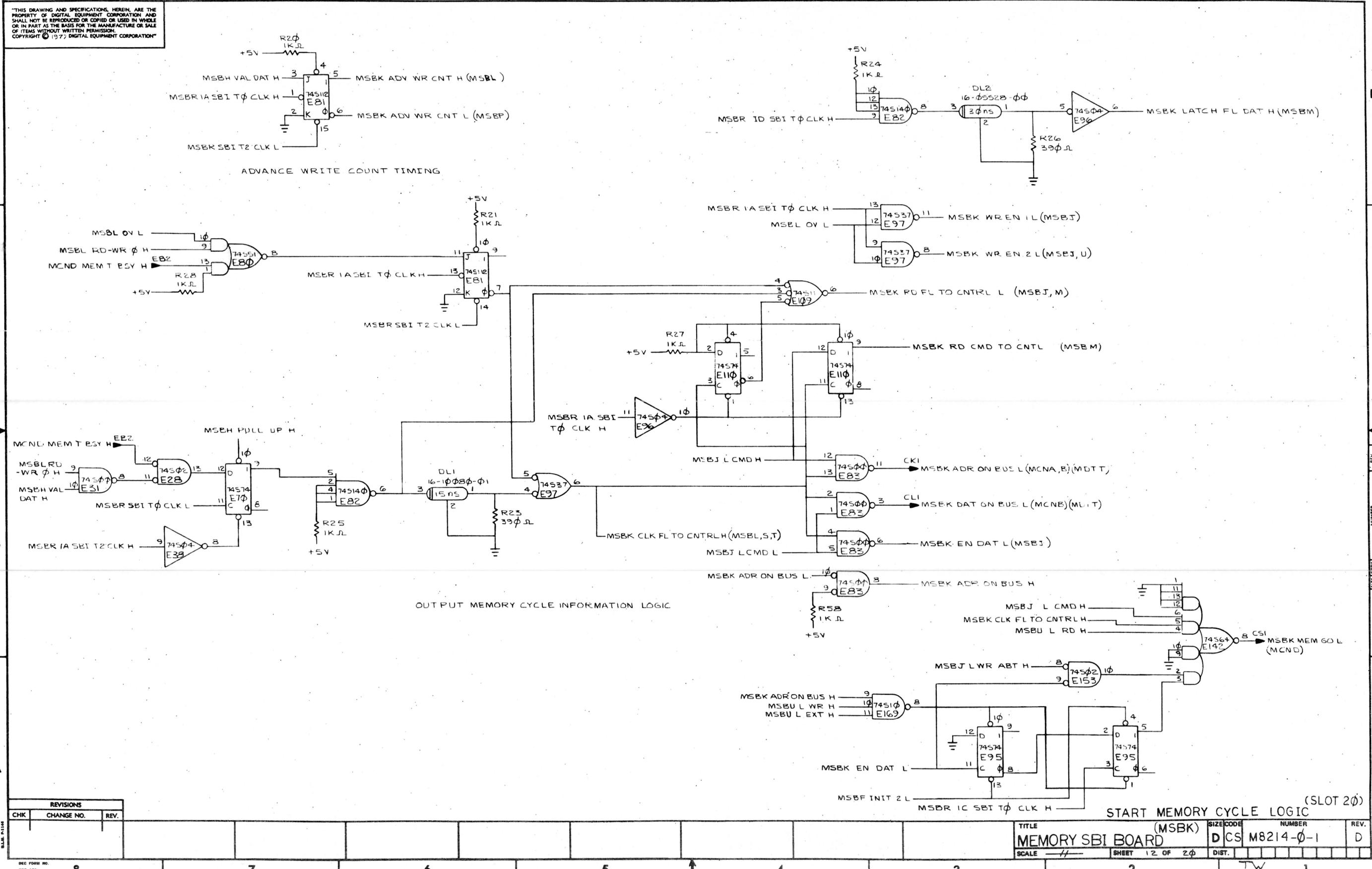
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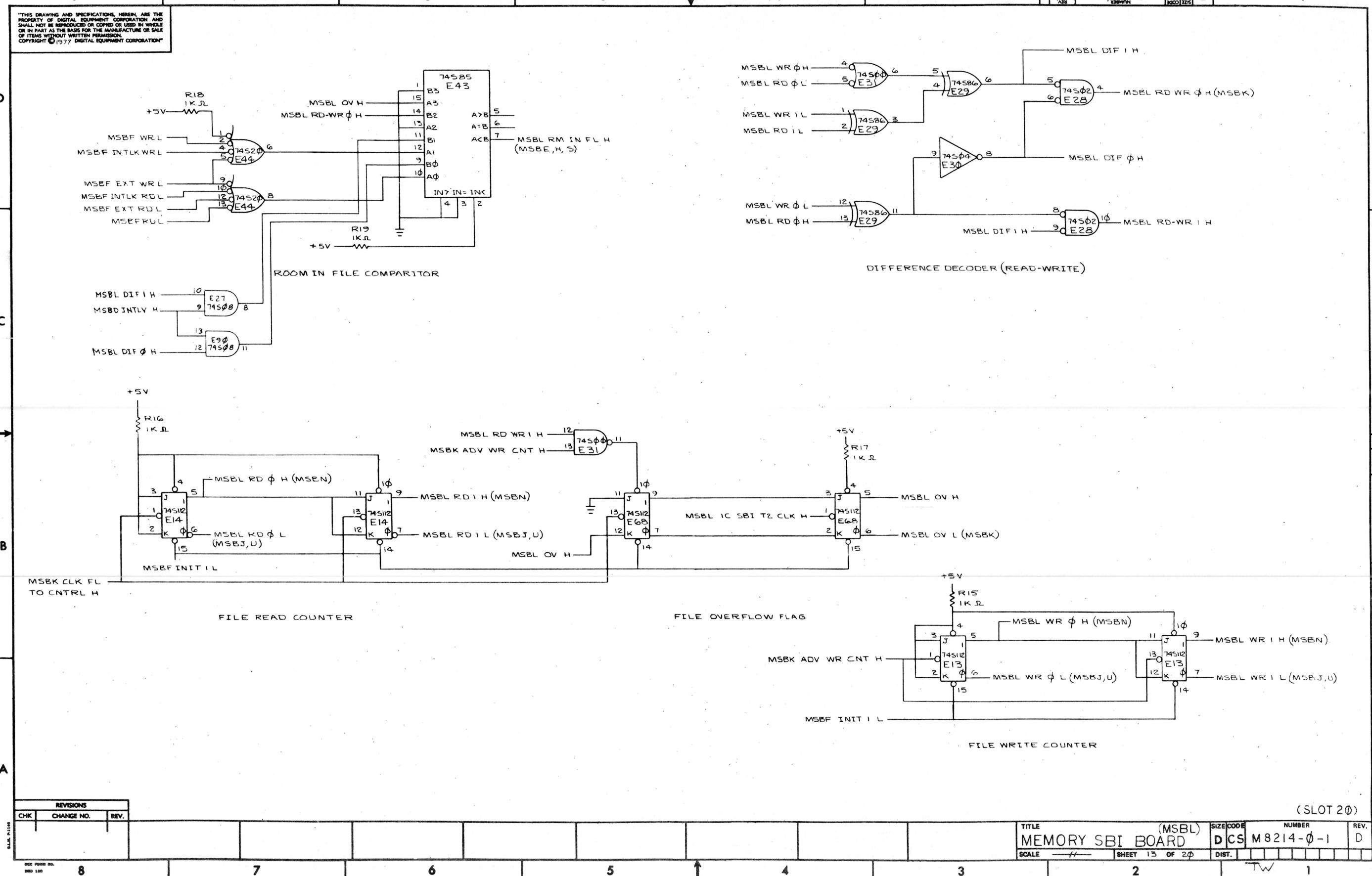
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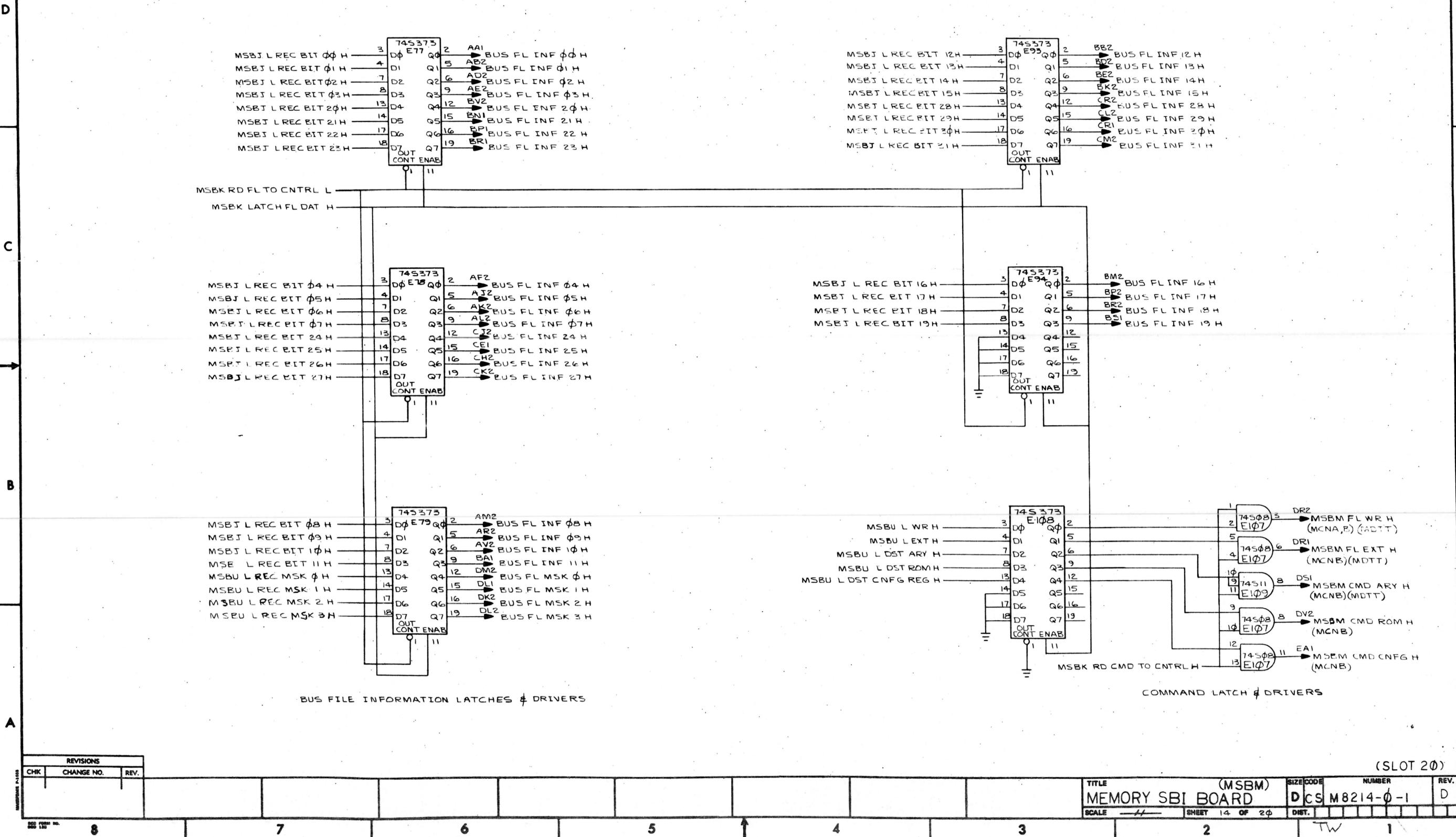
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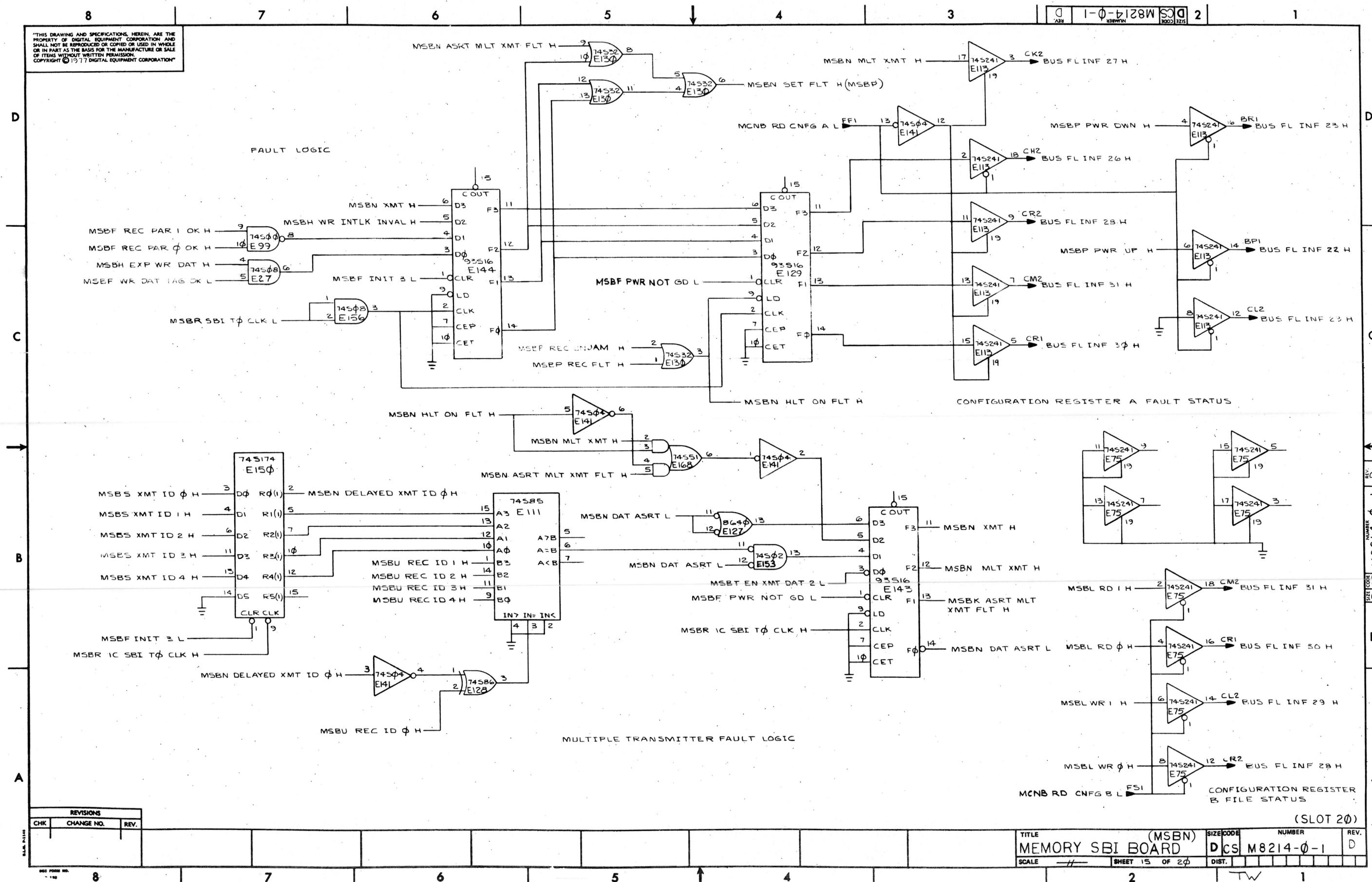
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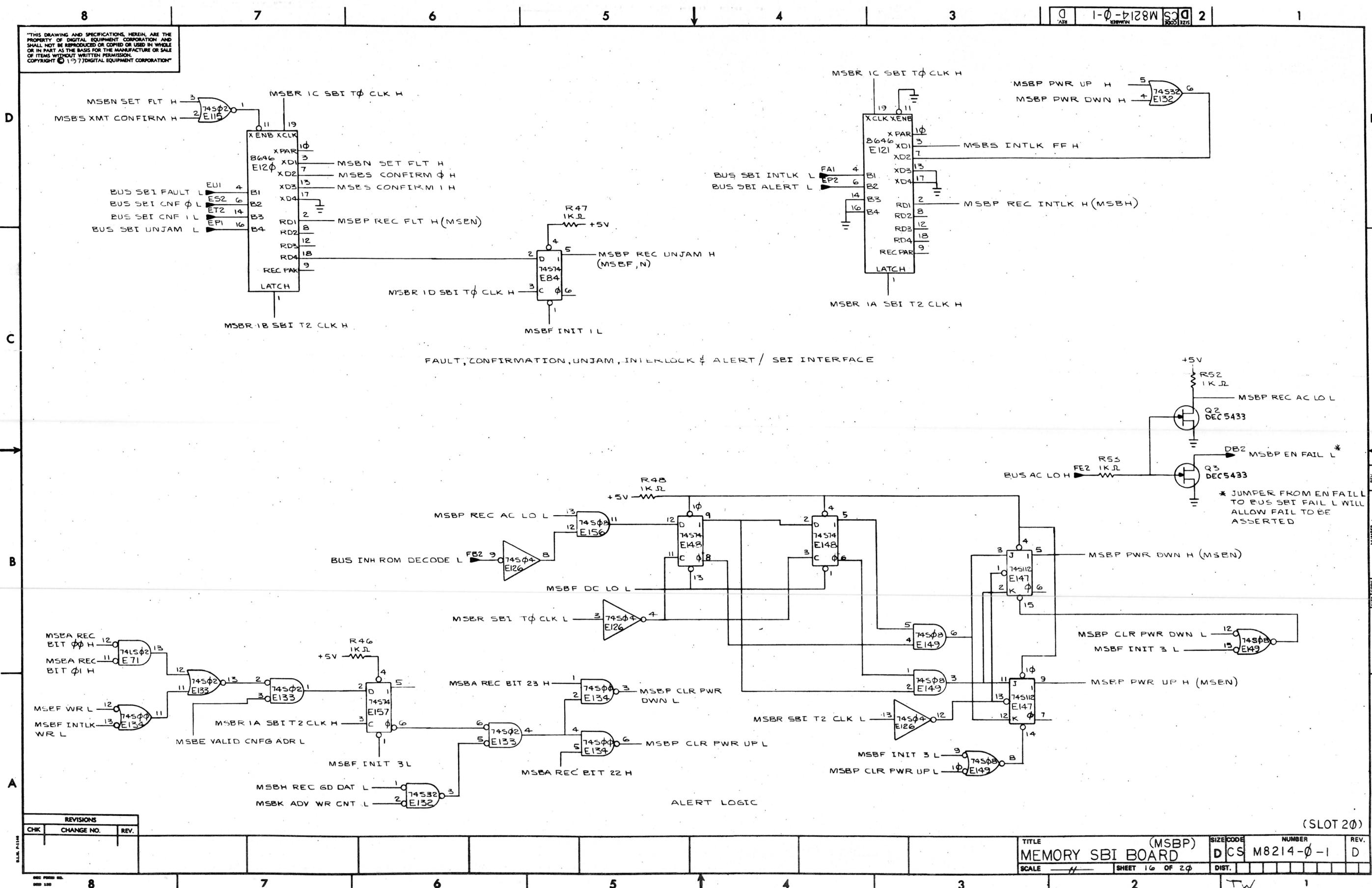
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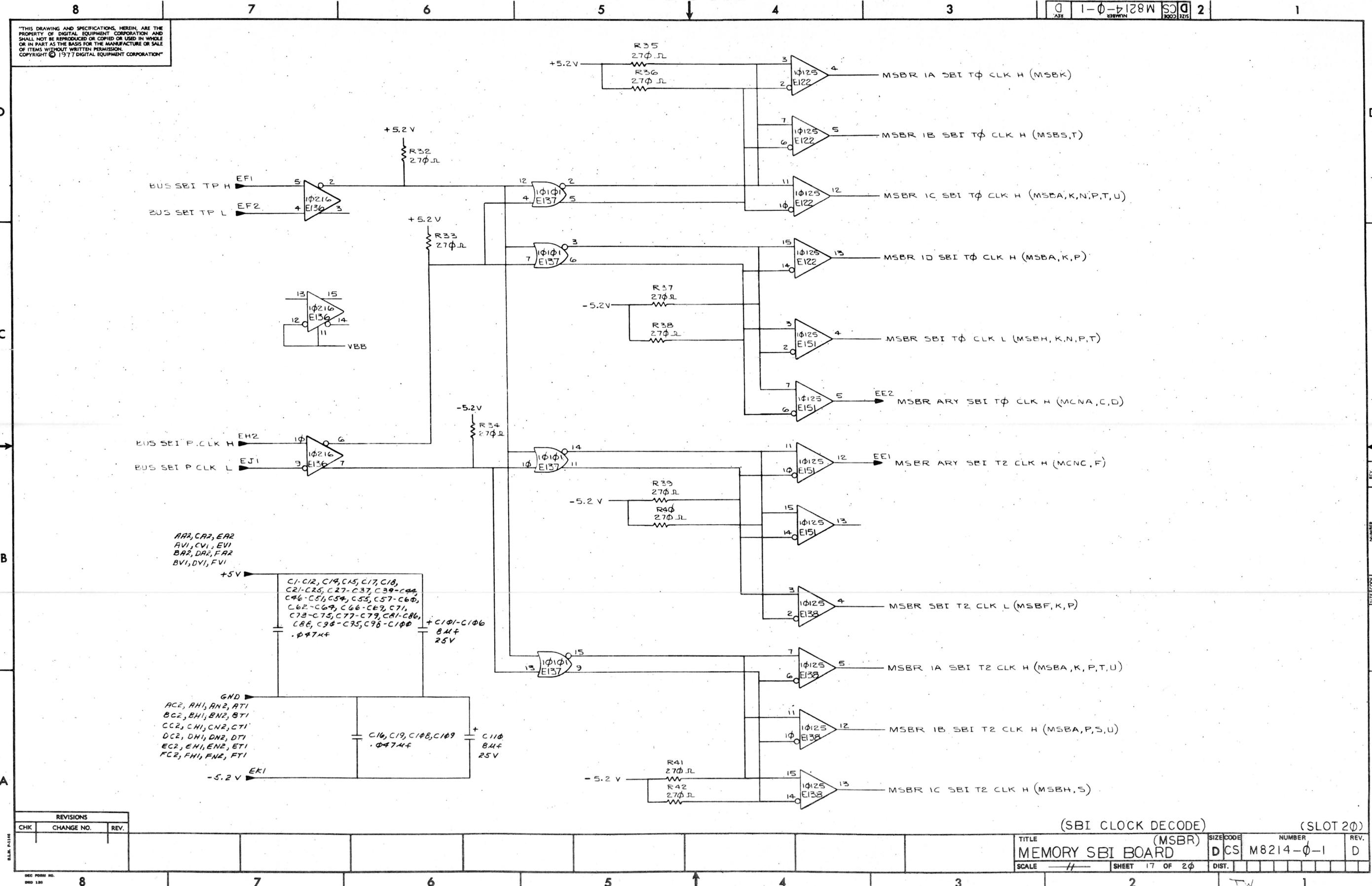
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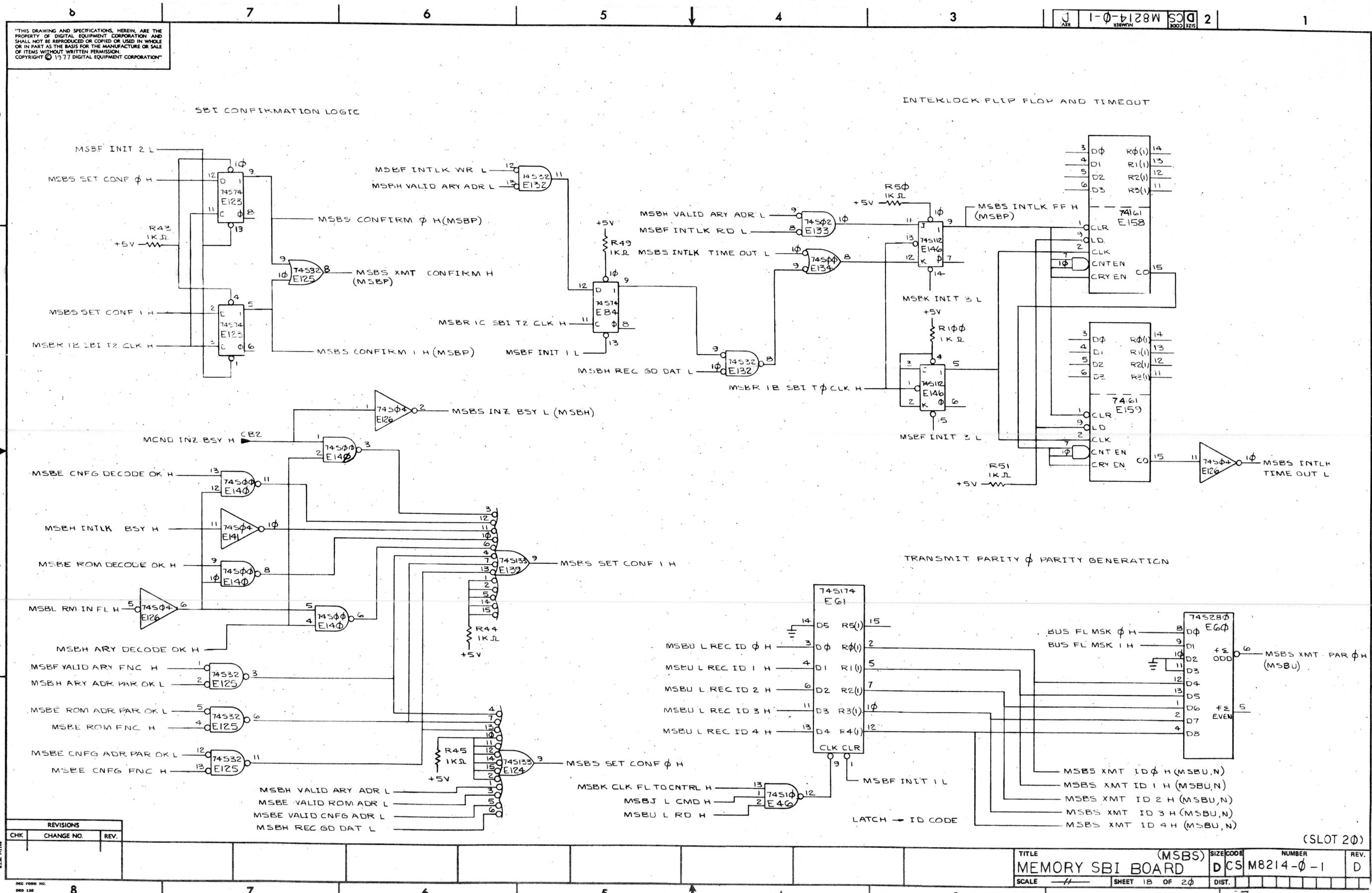
DCS M8214-0-1





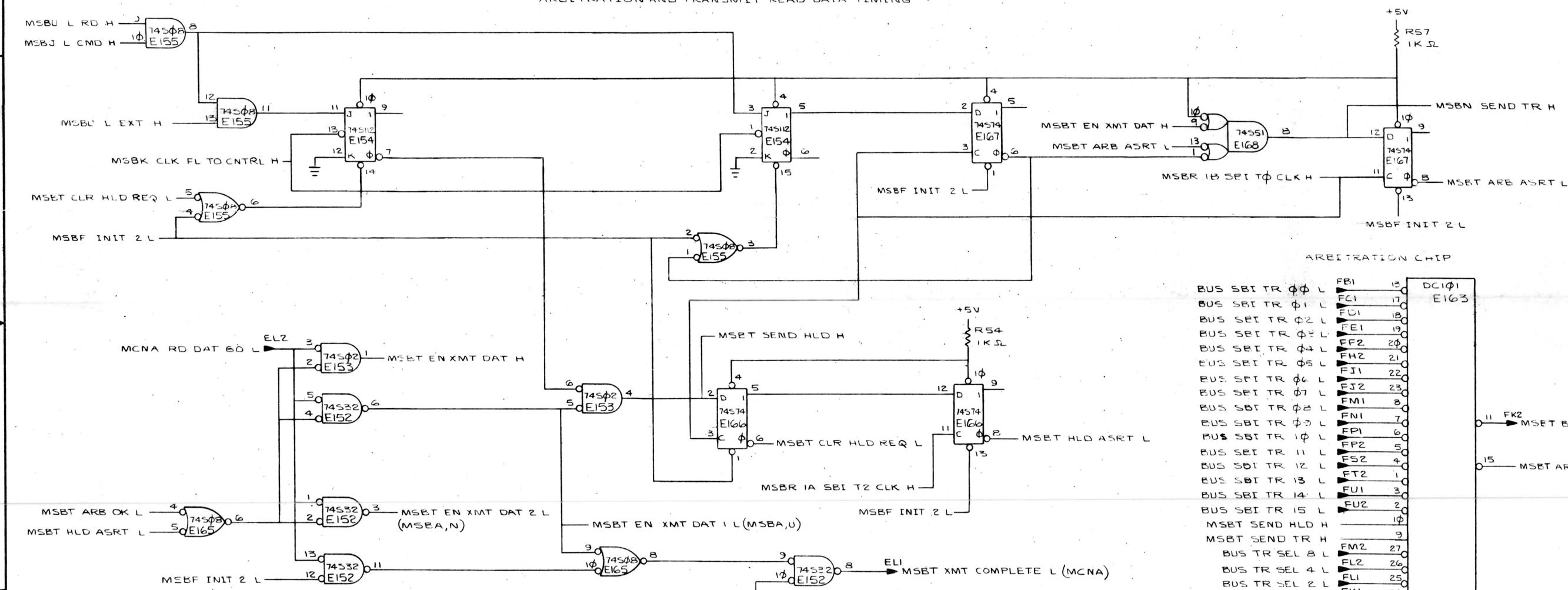






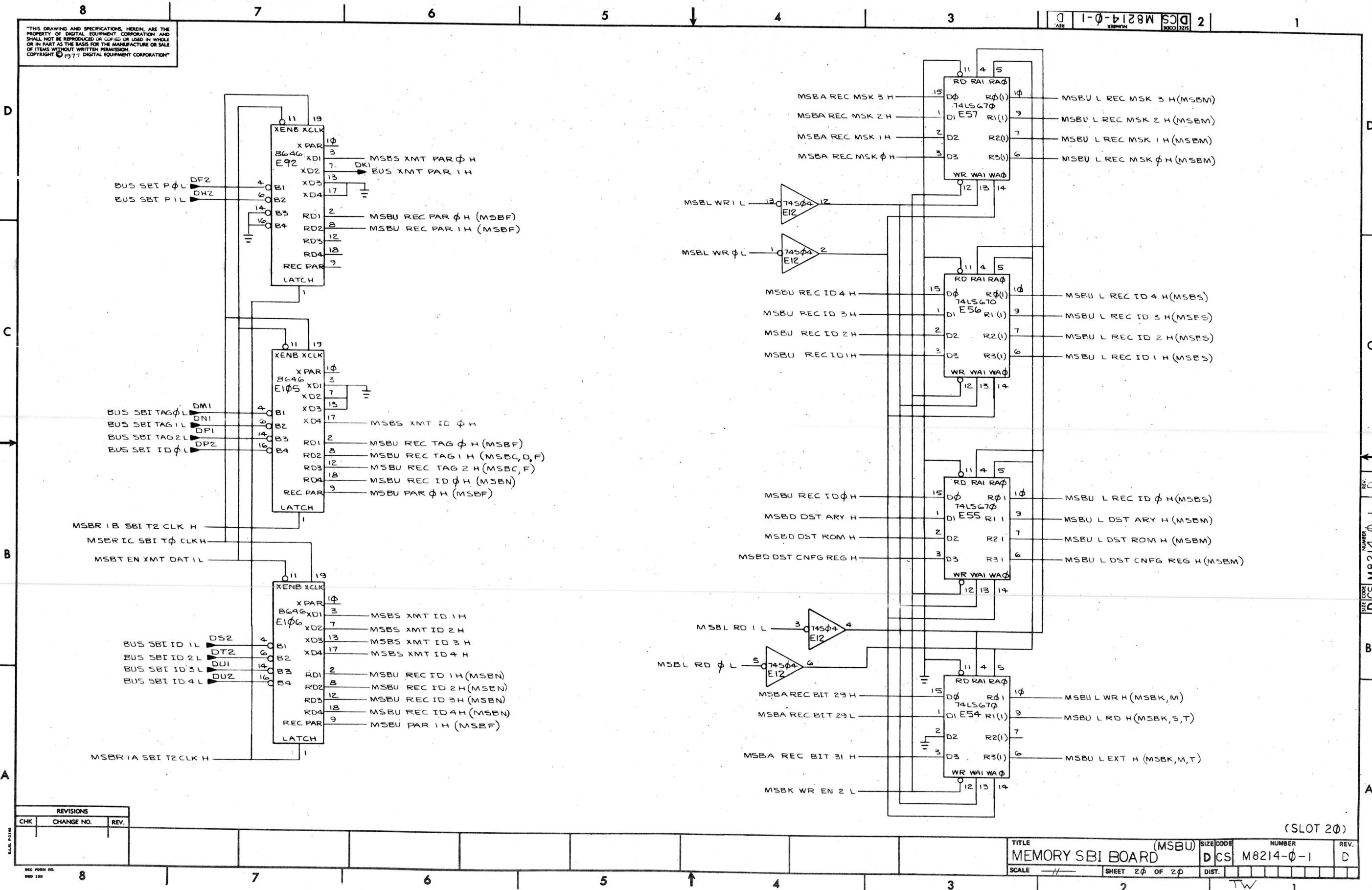
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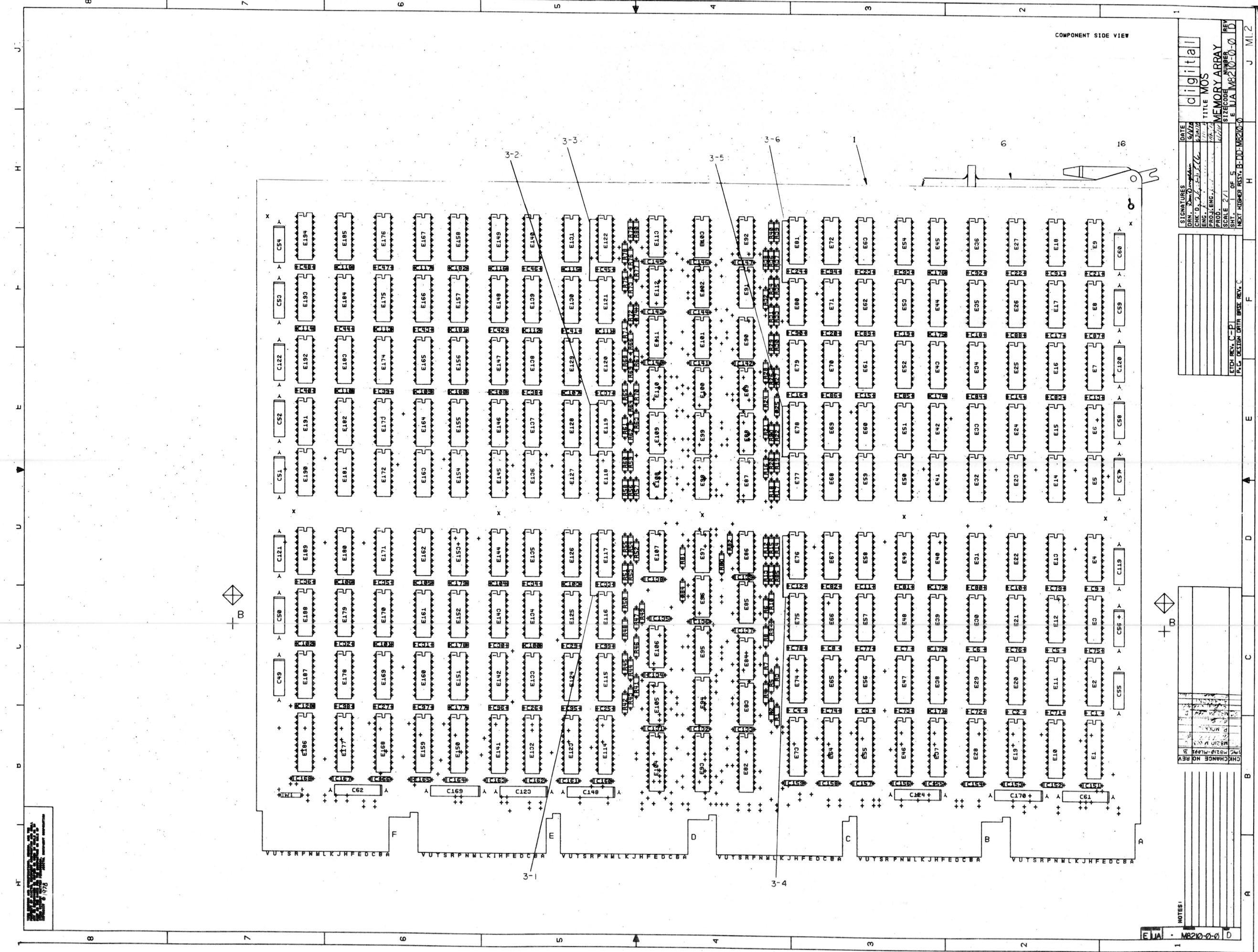
## ARBITRATION AND TRANSMIT READ DATA TIMING



Hand-drawn logic diagram showing connections between various bus lines and internal logic components like FBI, FCI, FDI, FEI, FFZ, FH2, FJ1, FJ2, FMI, FNI, FPI, FPZ, FSZ, FTZ, FUI, FUZ, FMZ, FLZ, FLI, FKI, and TCLK/RCLK. The diagram includes labels for DC1Φ1 E163, FK2 MSET BUSTR L, and MSBT ARB OK L.

\*NOTE: MSBT BUS TR L IS JUMPERED  
ON THE BACKPLANE TO THE PROPER.  
BUS SBT TRXX L ARBITRATION  
LINE



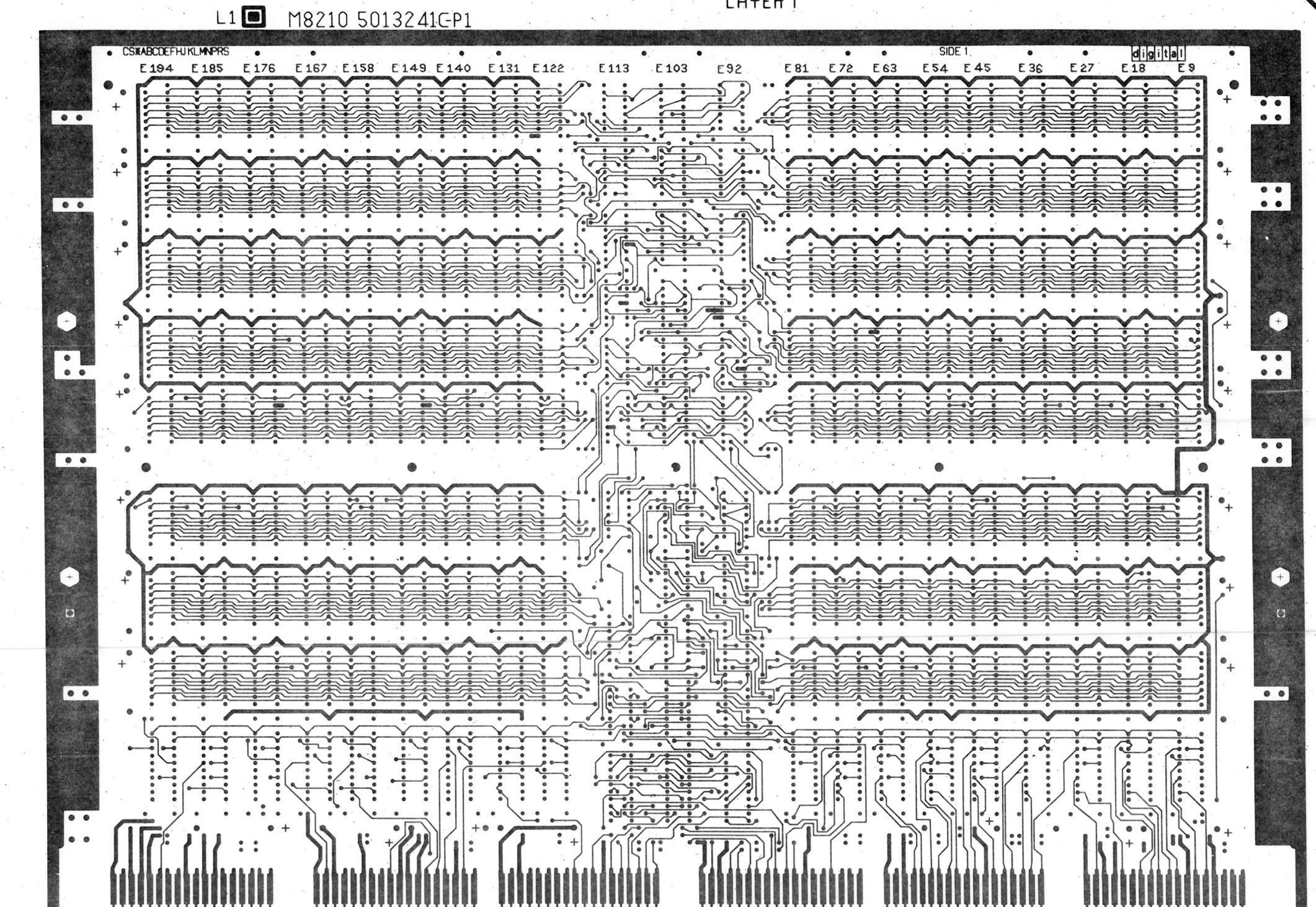


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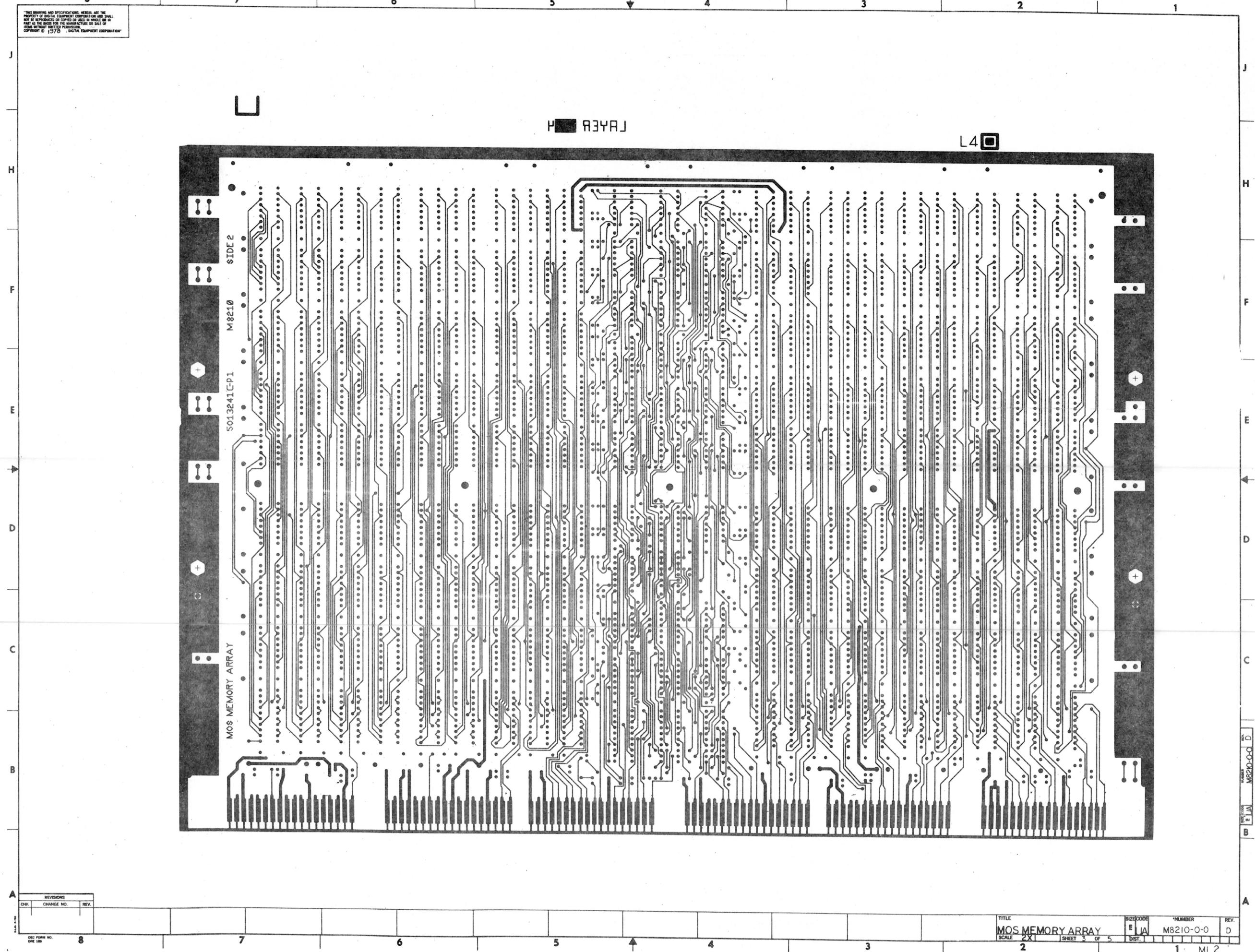
REVISIONS		
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TITLE: MOS MEMORY ARRAY  
SCALE: 2X1  
SHEET 2 OF 5  
NUMBER: E1UAM8210-0-0  
REV: D

ML2



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VUTSRPNMLKJHFEDCBA

VUTSRPNMLKJHFEDCBA

VUTSRPNMLKJHFEDCBA

VUTSRPNMLKJHFEDCBA

VUTSRPNMLKJHFEDCBA

VUTSRPNMLKJHFEDCBA

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REWORK INSTRUCTION SHEET

#### WIRE ADDS SIDE

3-1	ADD	WIRE	FROM	E116-1	TO	E117-1
3-2	ACC	WIRE	FROM	E119-1	TO	E119-1
3-3	ADC	WIRE	FROM	E121-1	TO	E122-1
3-4	ADD	WIRE	FROM	E75-1	TO	E76-1
3-5	ADD	WIRE	FROM	E77-1	TO	E78-1
3-6	ADC	WIRE	FROM	E80-1	TO	E81-1

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LINE ITEM DOCUMENT NO.

PART NO.

DESCRIPTION

QTY REFERENCE DESIGNATORS

19 NOTE: VARIATIONS AC,AB ARE IDENTICAL IN FUNCTION, ONLY THE VENDOR SUPPLIED MEMORY CHIPS ARE DIFFERENT.

\*\*\*\*\* RELEASEABLE \*\*\*\*\*

! TITLE	PARTS LIST	! SIZE ! CODE !	DOCUMENT NUMBER	! REV !
! DIGITAL EQUIPMENT CORPORATION ! ! MAYNARD, MASSACHUSETTS !	MOS MEMORY ARRAY	! K ! PL !	M8210-AC-DBP	! B !

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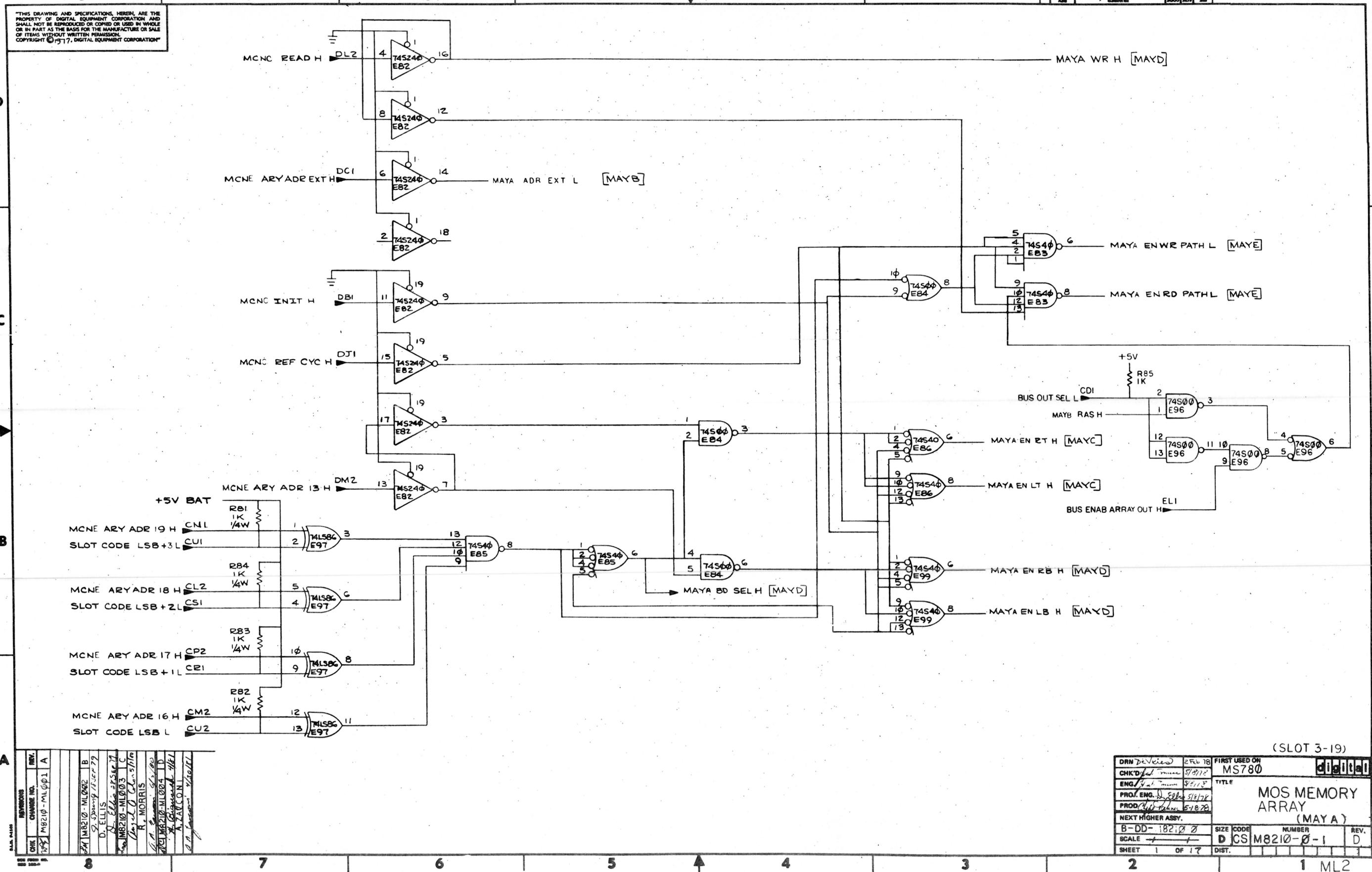
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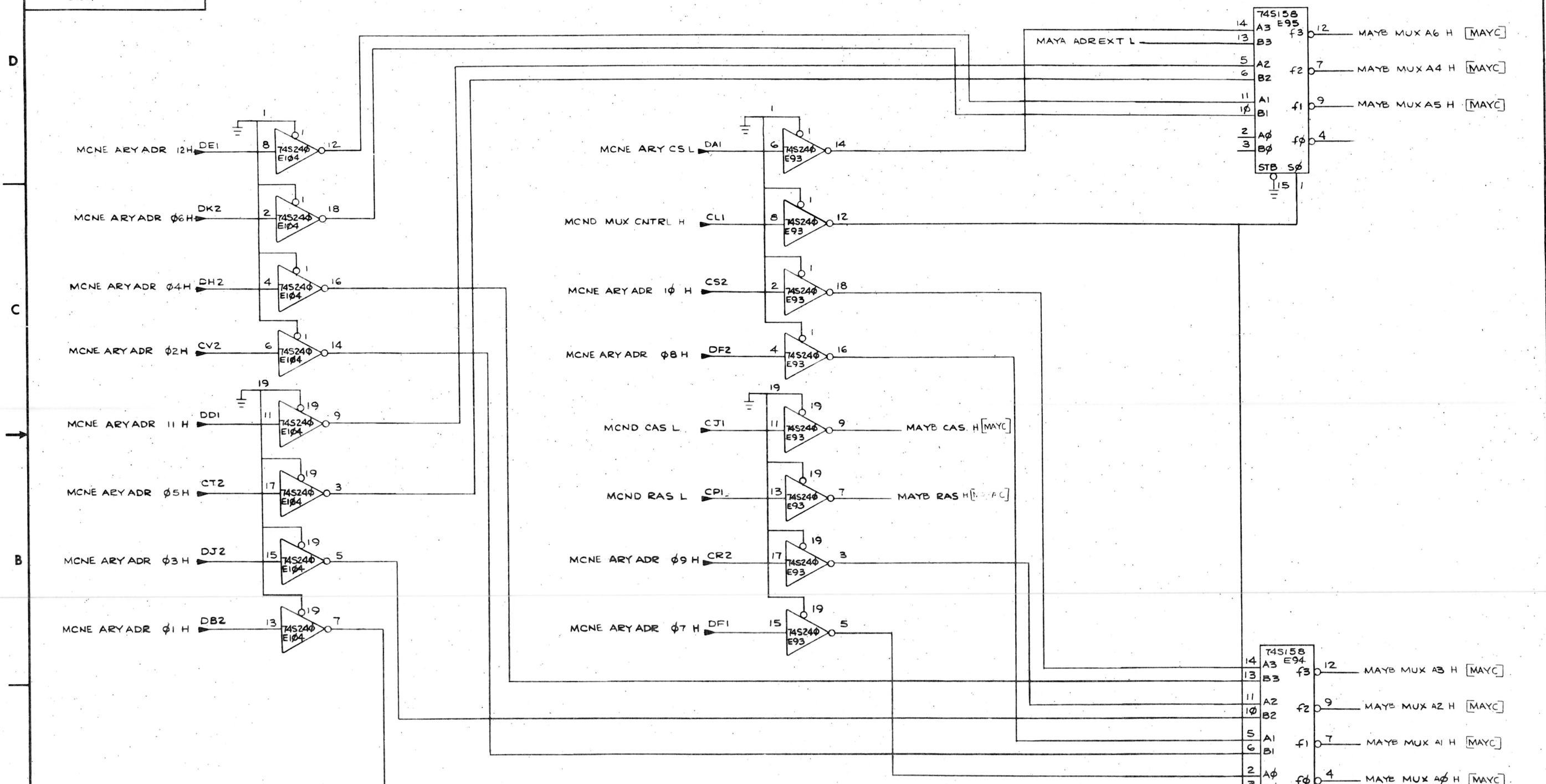
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(SLOT 3-19)

REVISIONS		
CHK	CHANGE NO.	REV.

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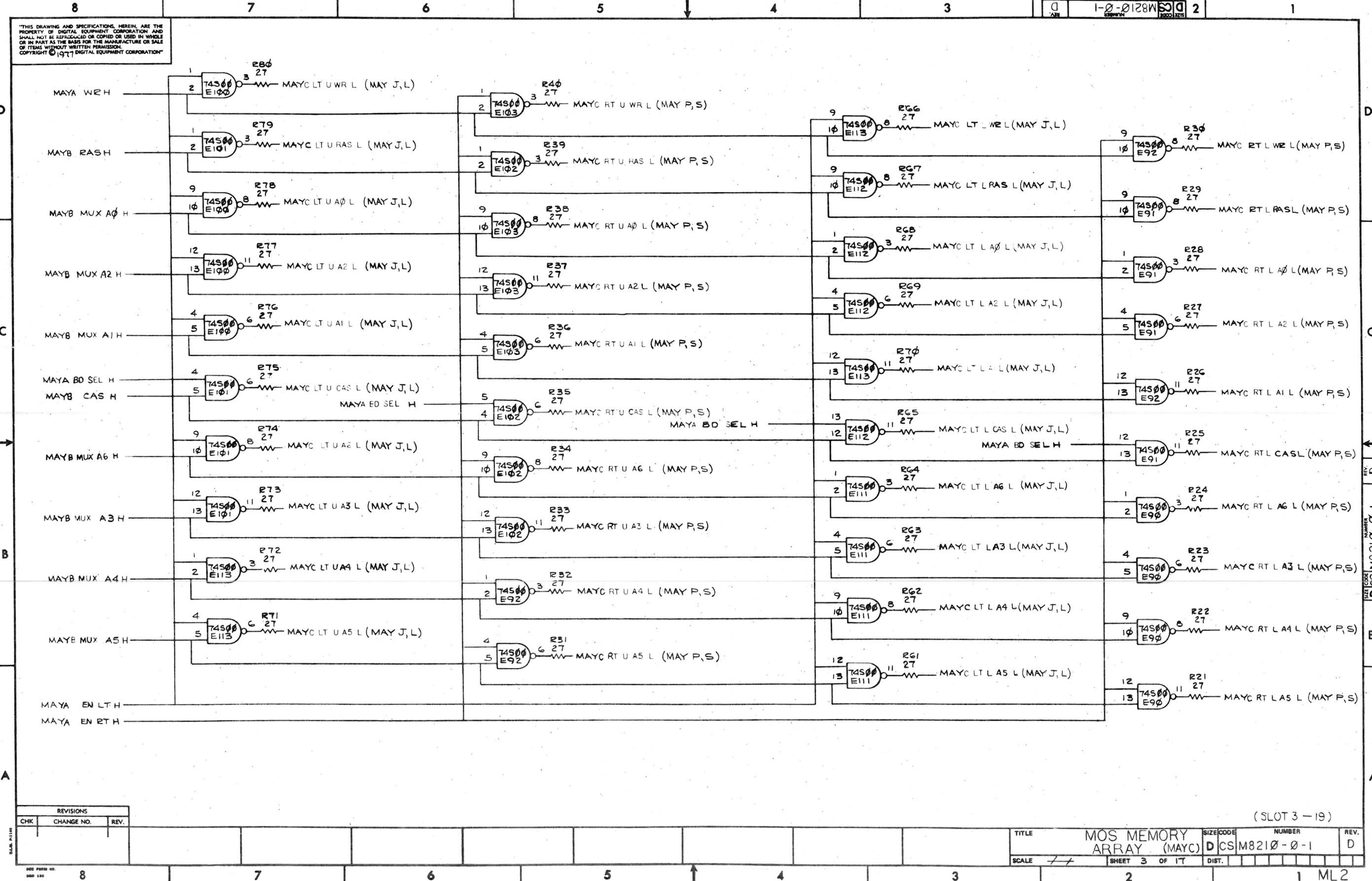
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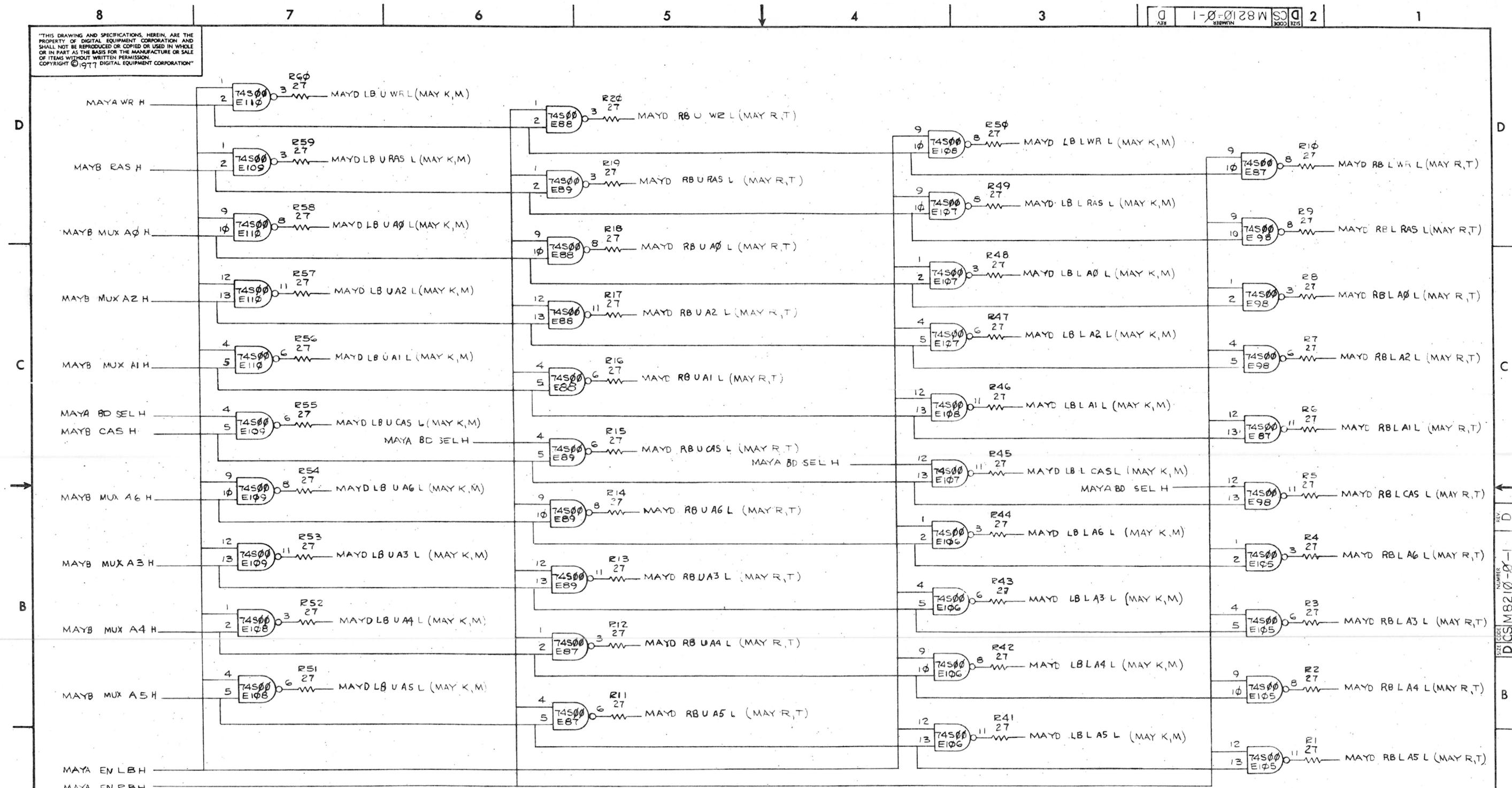
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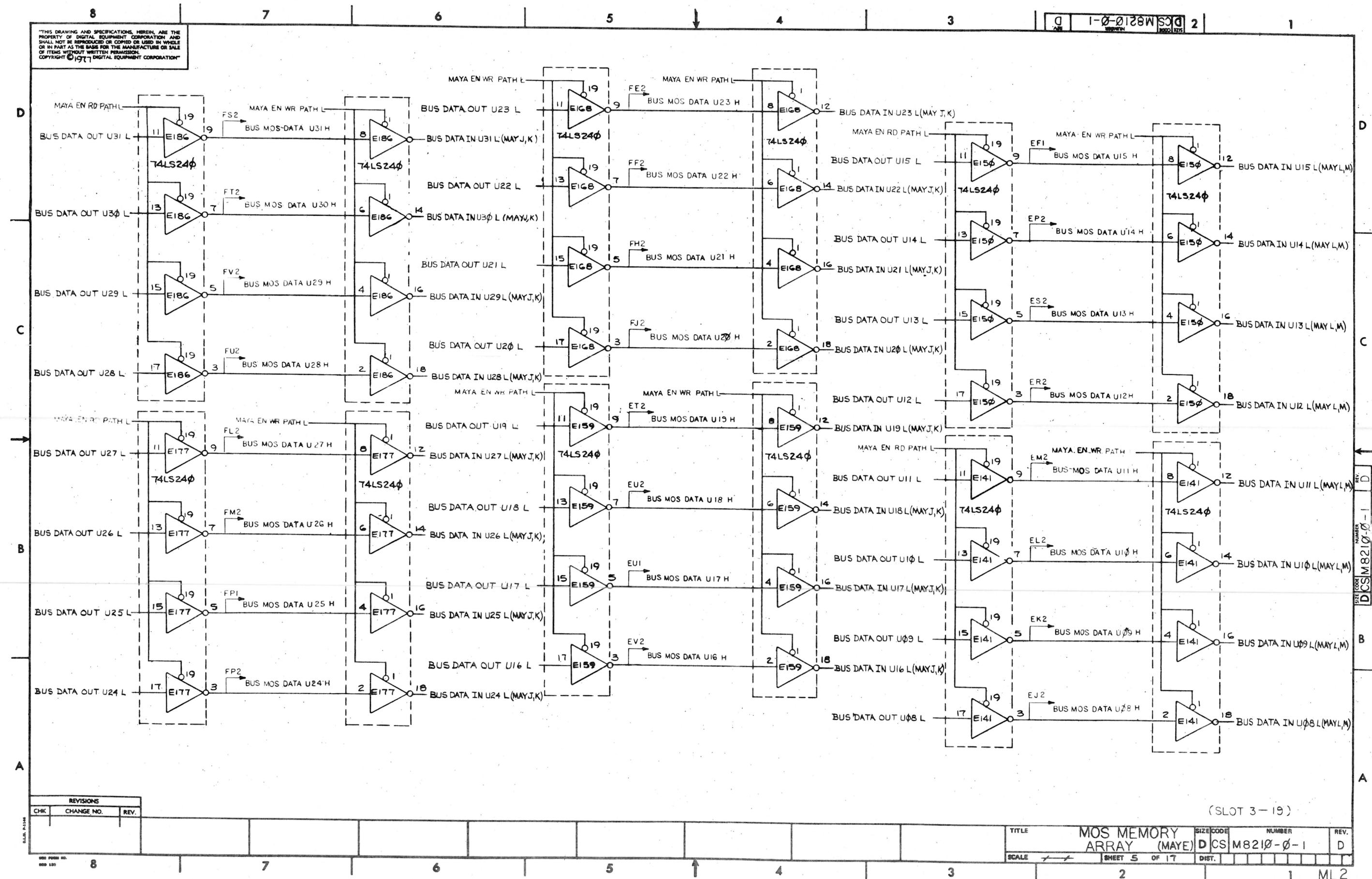
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SCALE	D CS M8210-0-1	REV. D		

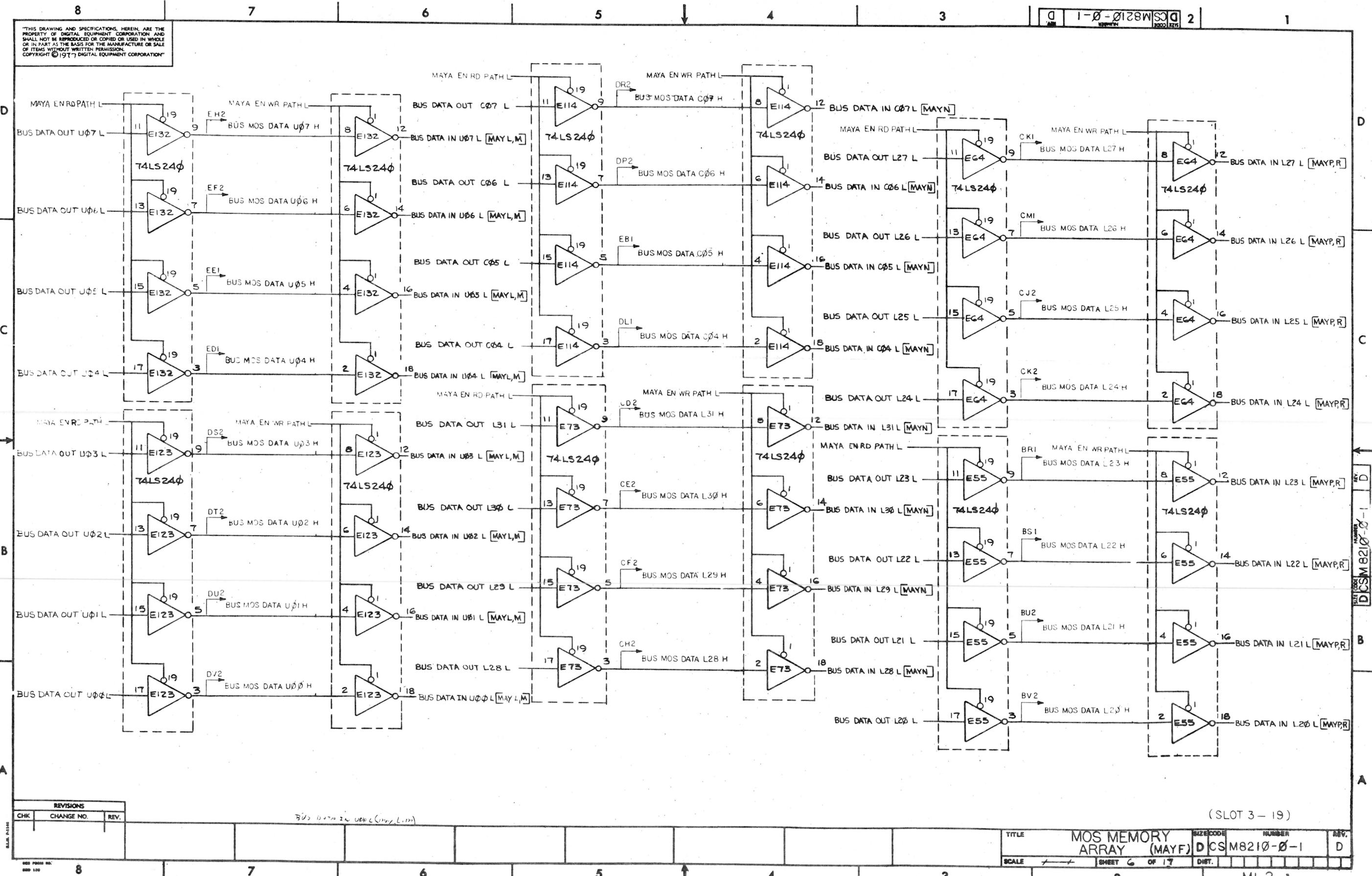
SHEET 2 OF 17 DIST.

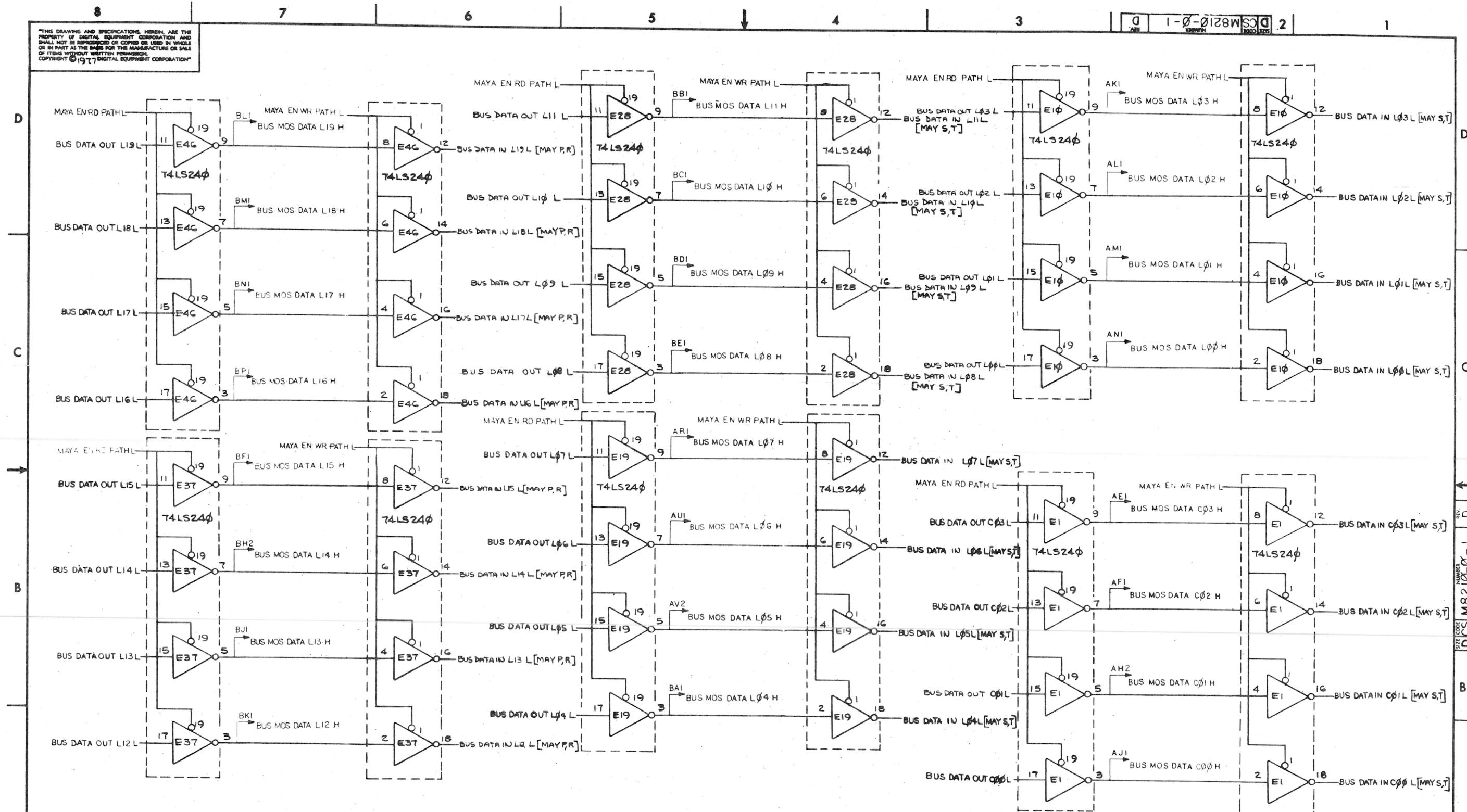




REVISIONS			(SLOT 3-19)											
CHK	CHANGE NO.	REV.												
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			SIZE	CODE	NUMBER									
			D	CS	M8210-0-1									
			SCALE	-/-	SHEET 4 OF 17	DIST.								
DEC FORM NO. 5010-108	8	7	6	5	4	3	2	1	M12					







REVISIONS		
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(SLOT 3-19)

MOS MEMORY  
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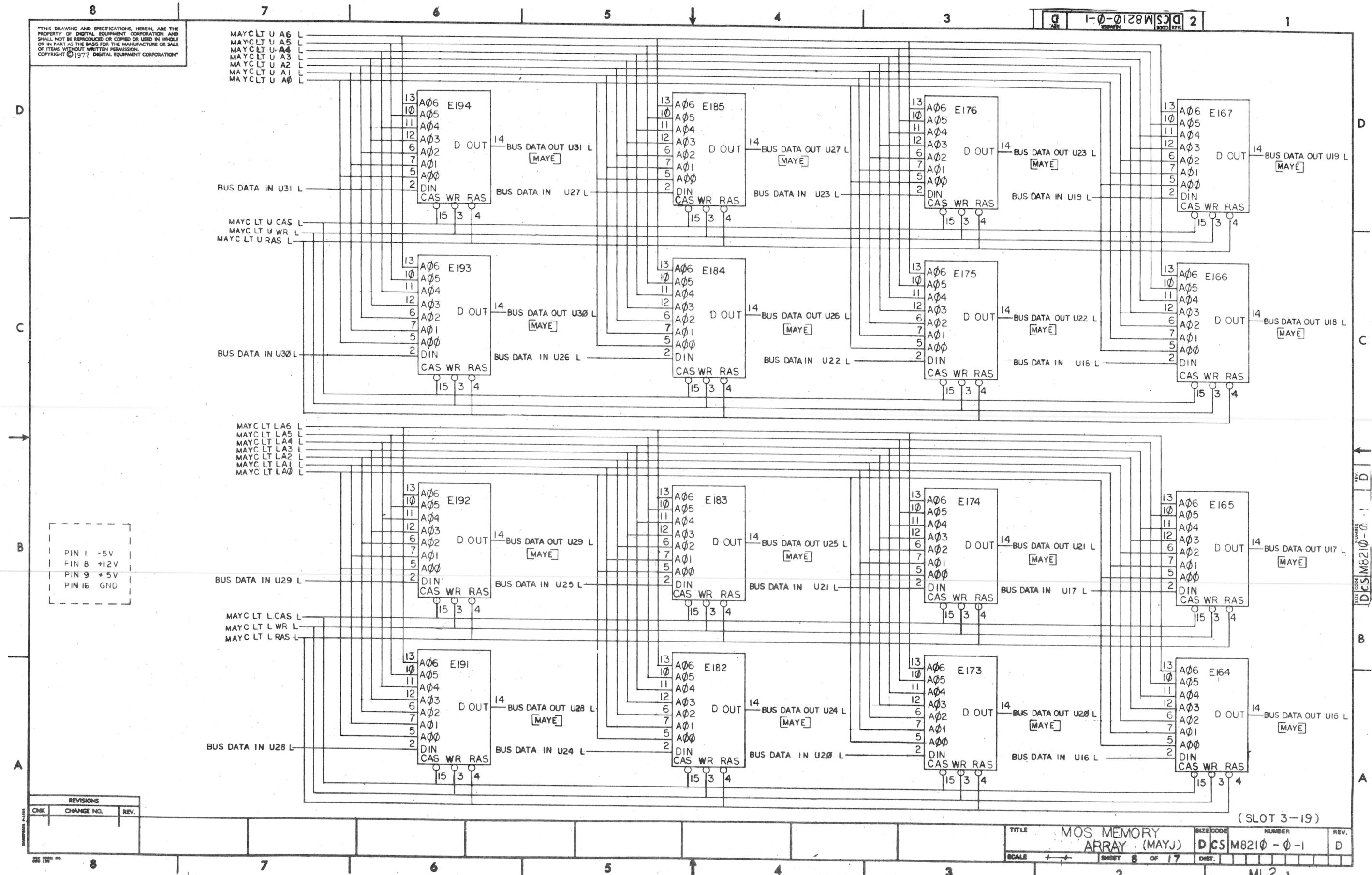
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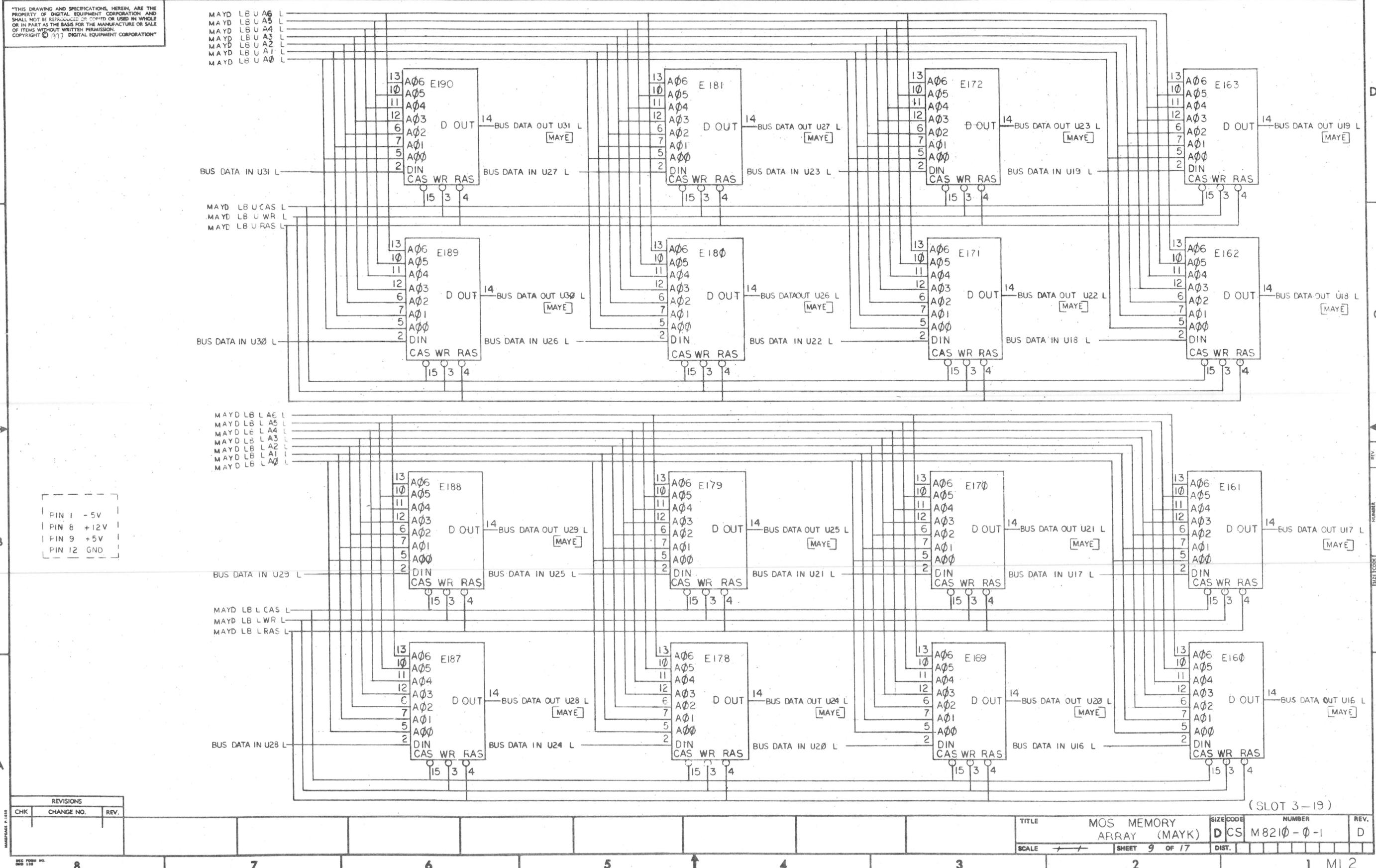
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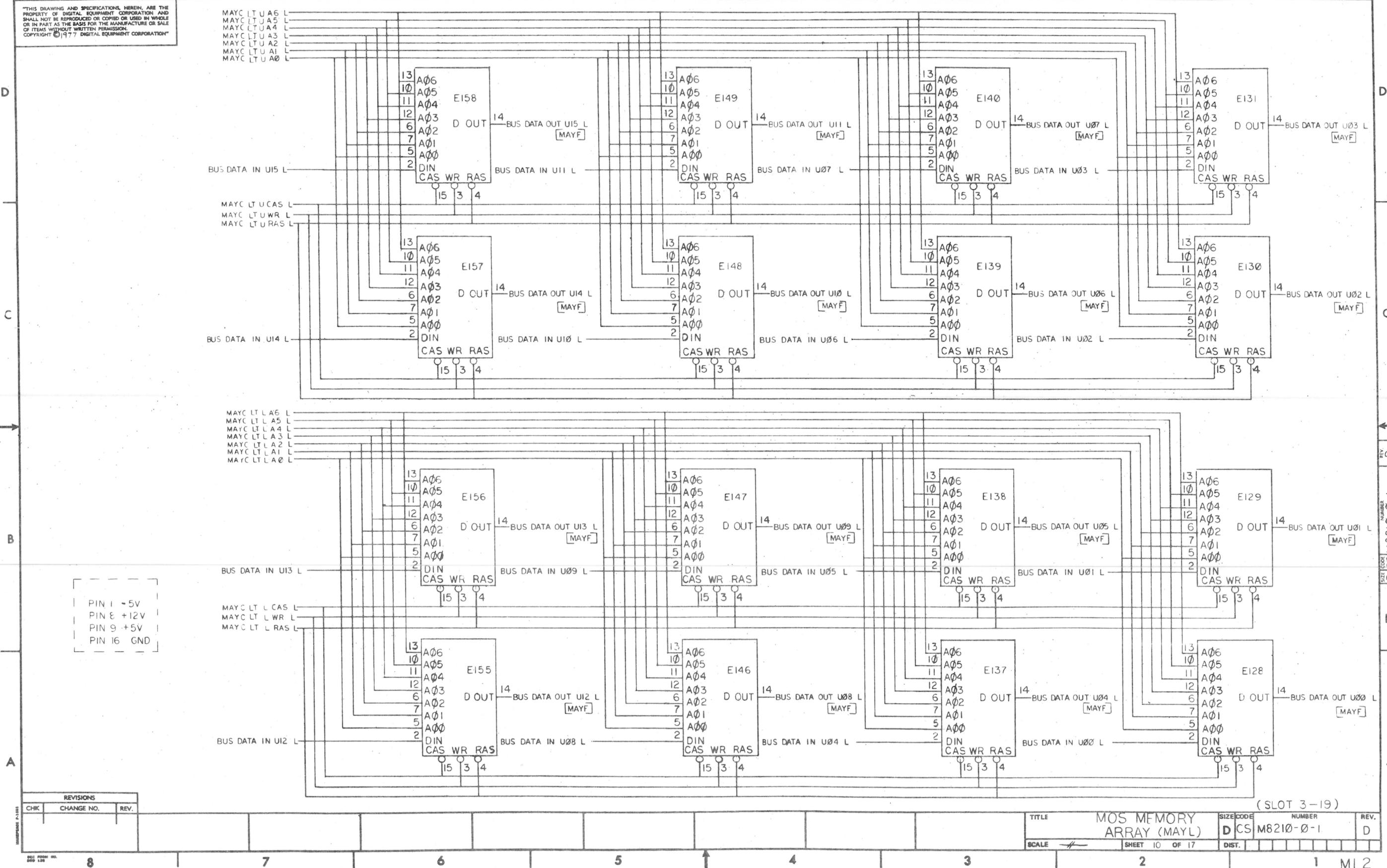
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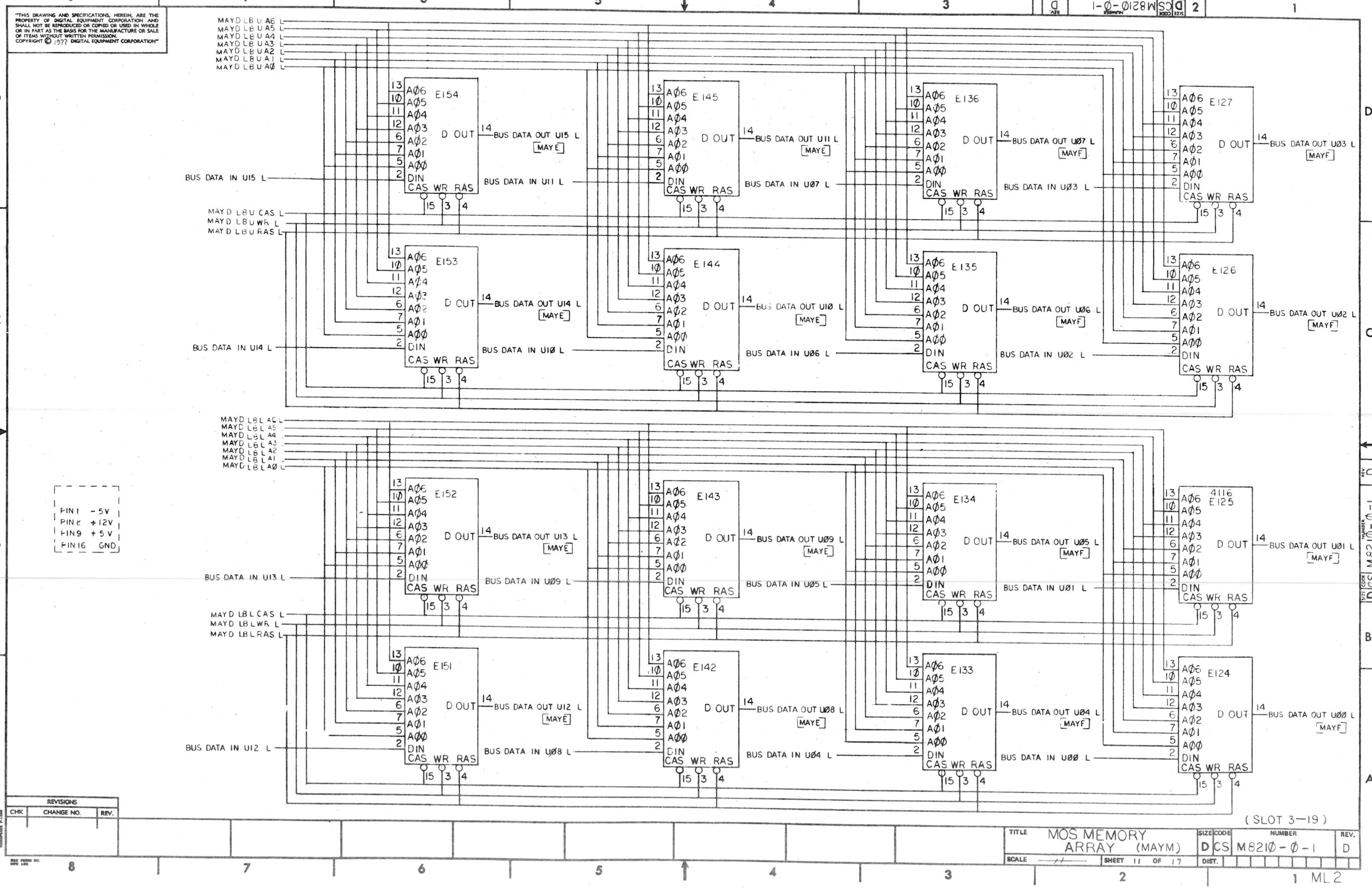
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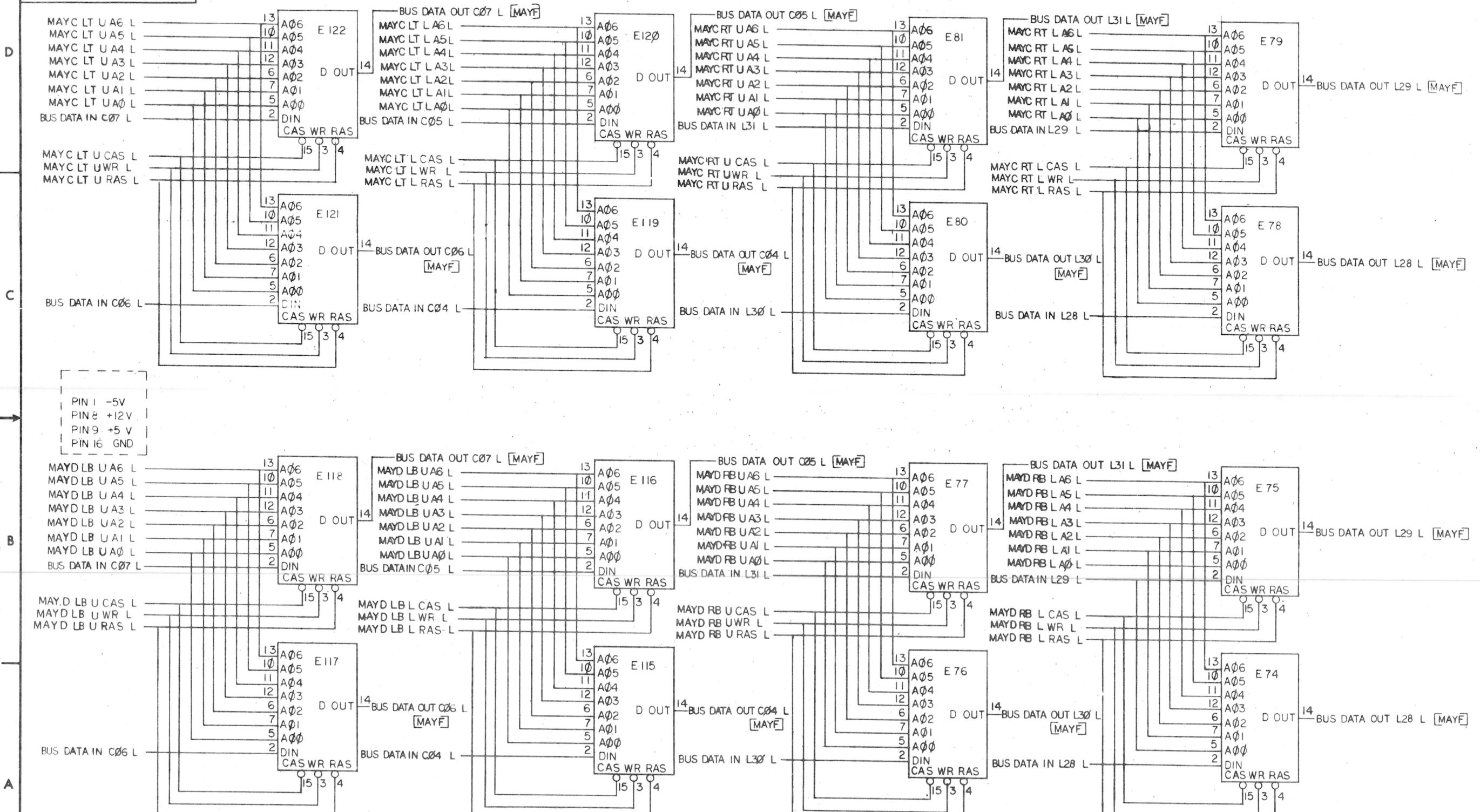
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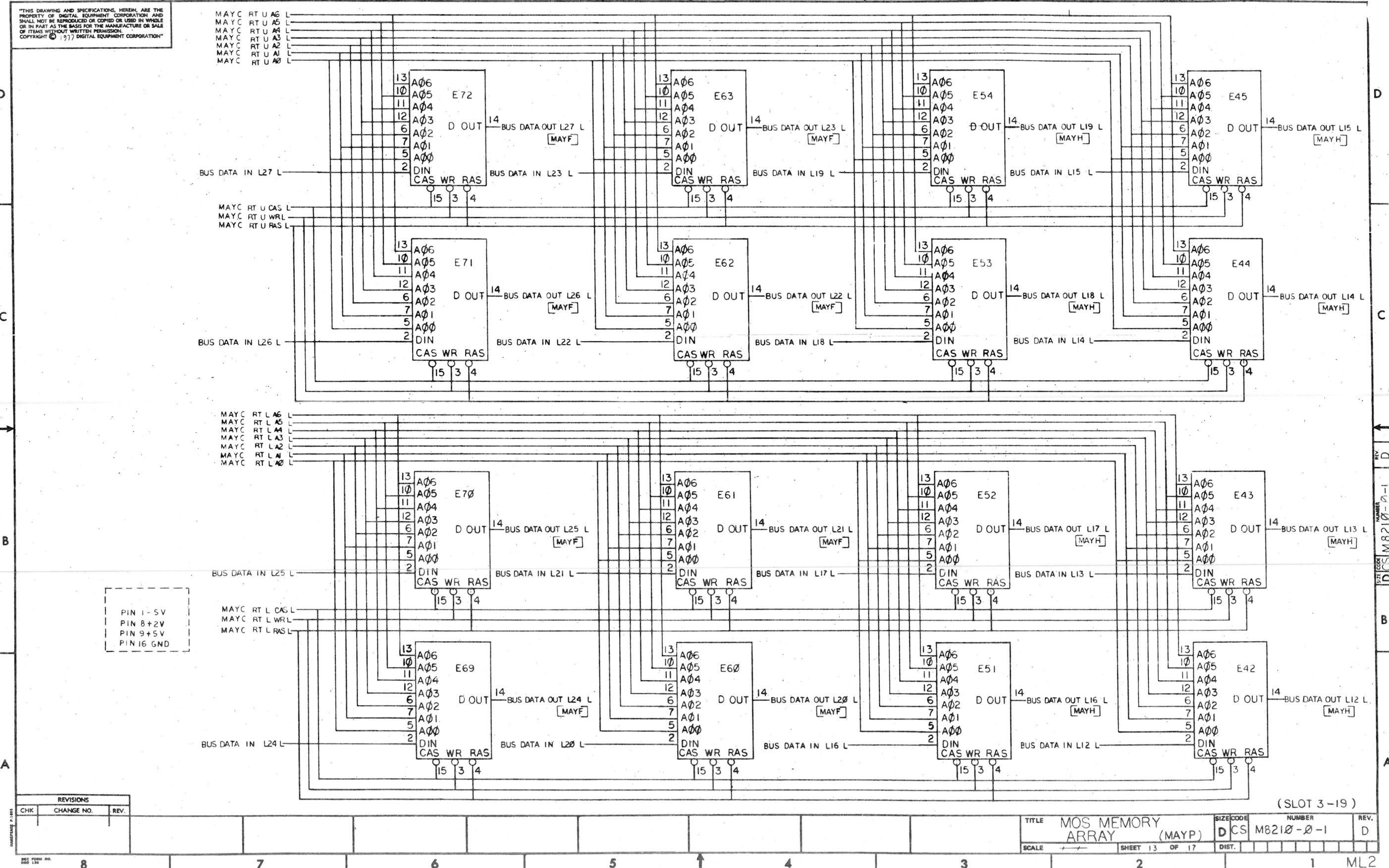
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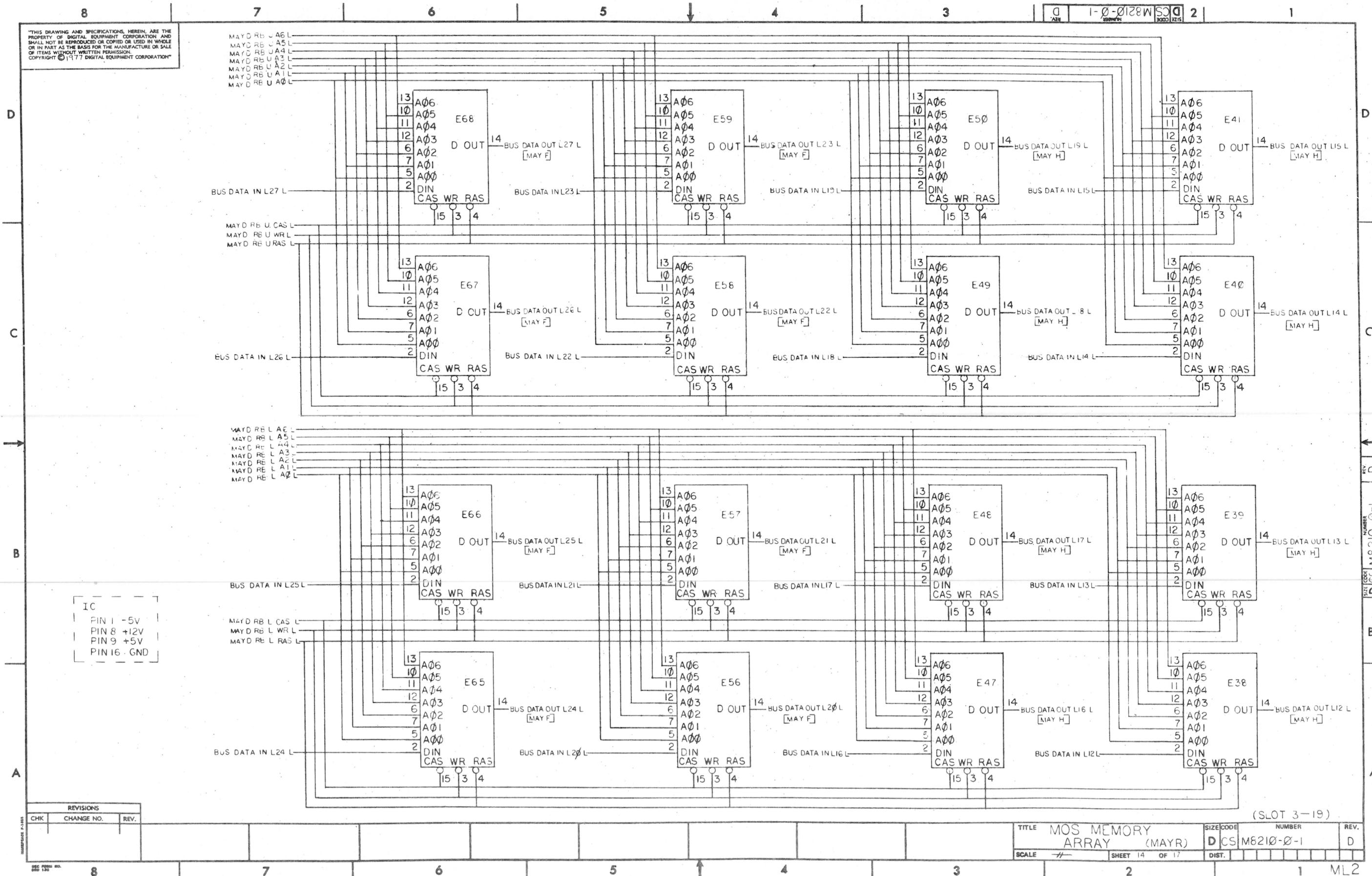
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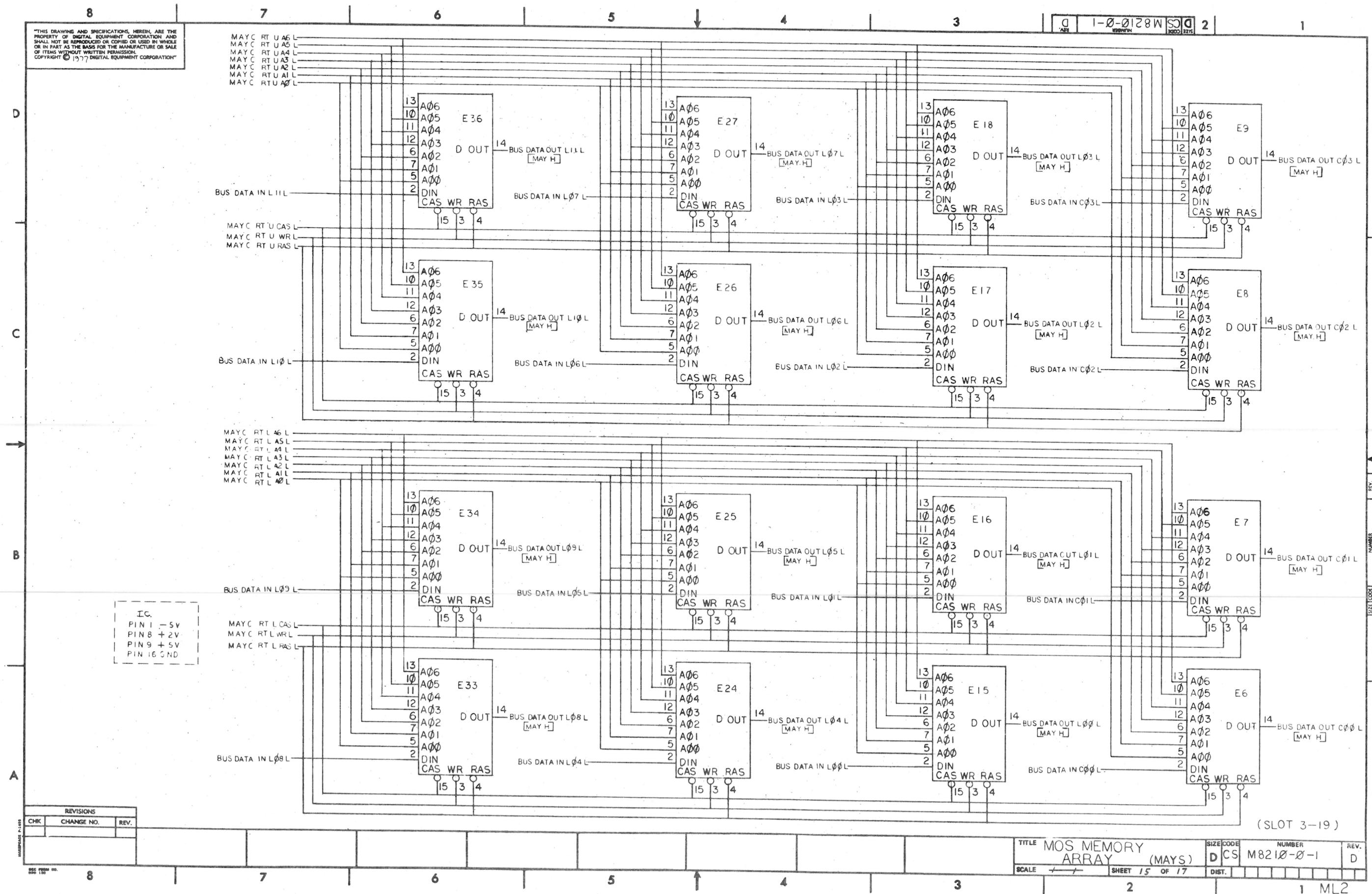
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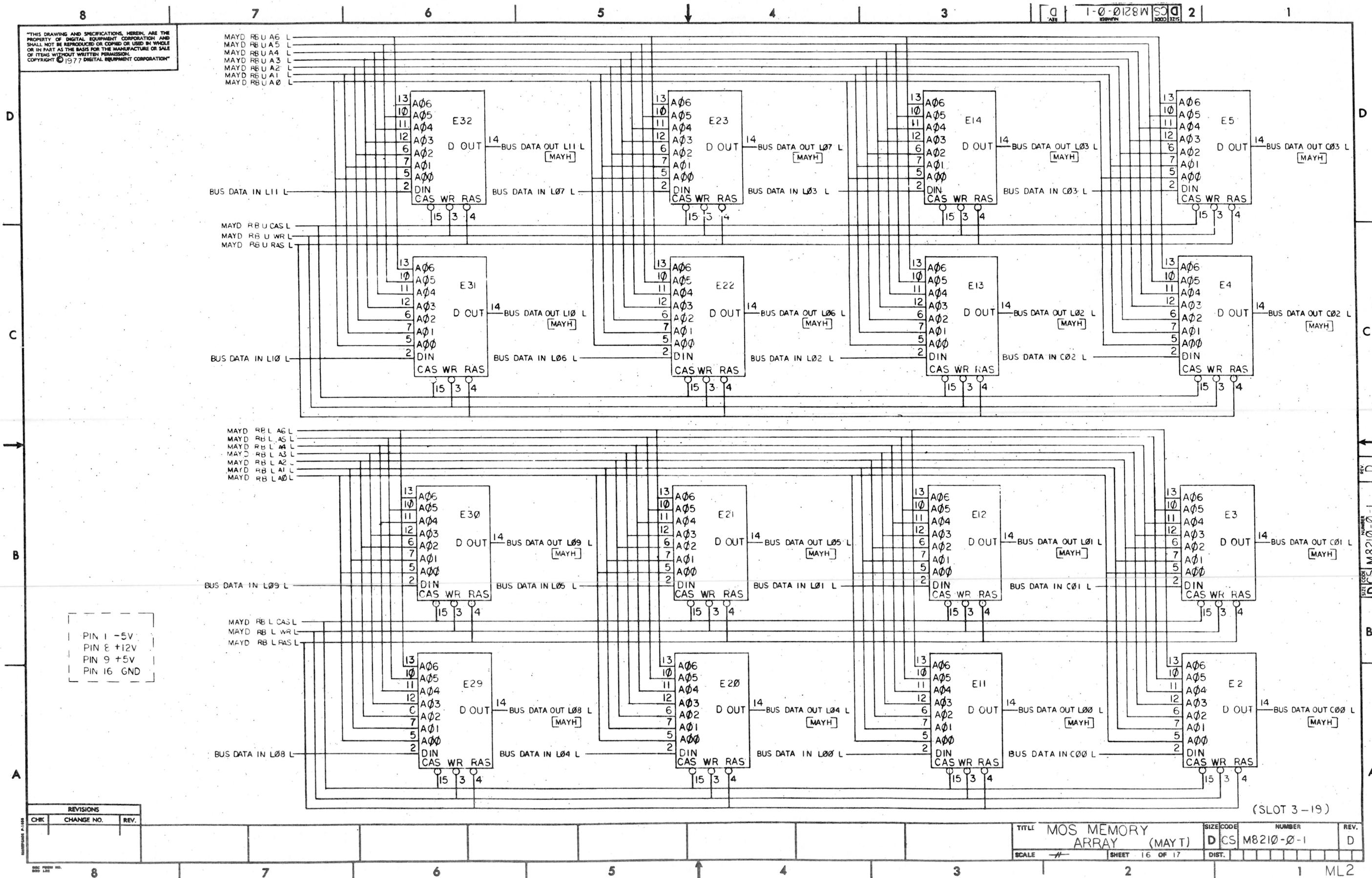
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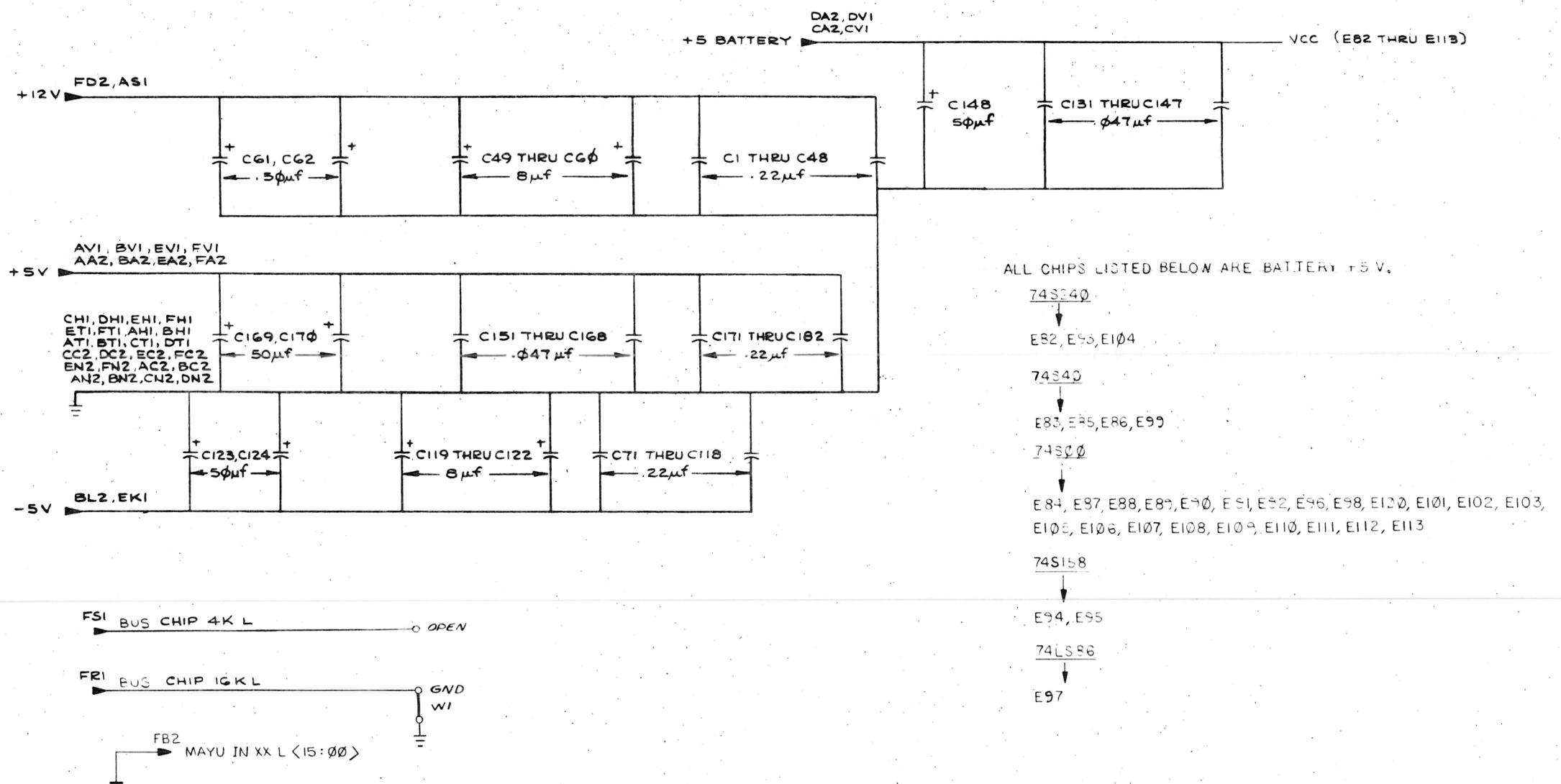
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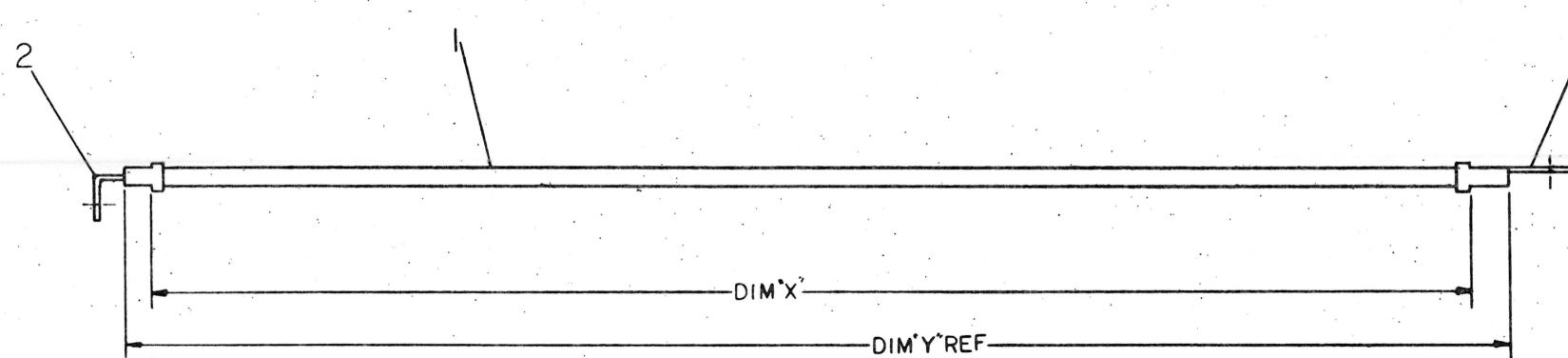


(SLOT 3-19)

REVISIONS			TITLE			SIZE		NUMBER		REV.	
CHK	CHANGE NO.	REV.	MOS MEMORY ARRAY (MAYU)			CODE		M8210-0-1	D		
	1										
DRAWN BY			SHEET 17 OF 17			SCALE		DIST.			

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LEGEND		
PART NO.	DIM'X VARIATION	DIM'Y (PRECUT) REF
7014250-01	1 FT - 0 IN ± .5 IN	1 FT - 1 IN ± .5 IN
7014250-OK	0 FT - 8 IN ± .5 IN	0 FT - 9 IN ± .5 IN



ITEM NO.	DESCRIPTION	DWG./PART NO.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
1	LUG, POWER, STRAIGHT	1211515-00
1	LUG, POWER 90°	1212086-02
1	WIRE BANG BLACK	9107765-00
NOMINAL DIMENSION RANGE INCHES		
ANGLES 45° 30°	CLASS OF ACCURACY	OVER 0.5 OVER 1.2 OVER 4.0 OVER 12.0 OVER 48.0
SURFACE QUALITY IN (CHECK ONE)	0.005 0.005 0.005 0.005 0.005	0.005 0.005 0.005 0.005 0.005
MATERIAL MEDIUM	2.000 2.000 2.000 2.000 2.000	2.000 2.000 2.000 2.000 2.000
QUANTITY & VARIATION	MACHINERIES	PREFERRED
	0.012	0.016 0.025 0.04 2.000 40.1
FIRST USED ON VAX 11/780		
DRN. No. 00001 Rev. A	CHK'D by R. Martel	ENG. by R. Martel
REMOVE BURRS AND BREAK SHARP CORNERS	PROJ. ENGR. by R. Martel	PROD. ENGR. by R. Martel
DO NOT SCALE DWG.	NEXT HIGHER ASSY.	
MATERIAL SEE PARTS LIST	E-UA-11780-0-0	SIZE CODE D IA
FINISH	SCALE NONE	NUMBER 7014250-0-0
		REV. A

REVISIONS	
CHK	CHANGE NO.
A	REV.
7014250-00001	A
R. Martel	10 Oct 77
R. Martel	10 Oct 77

CABLE, POWER  
(RTP MEMORY BLK)

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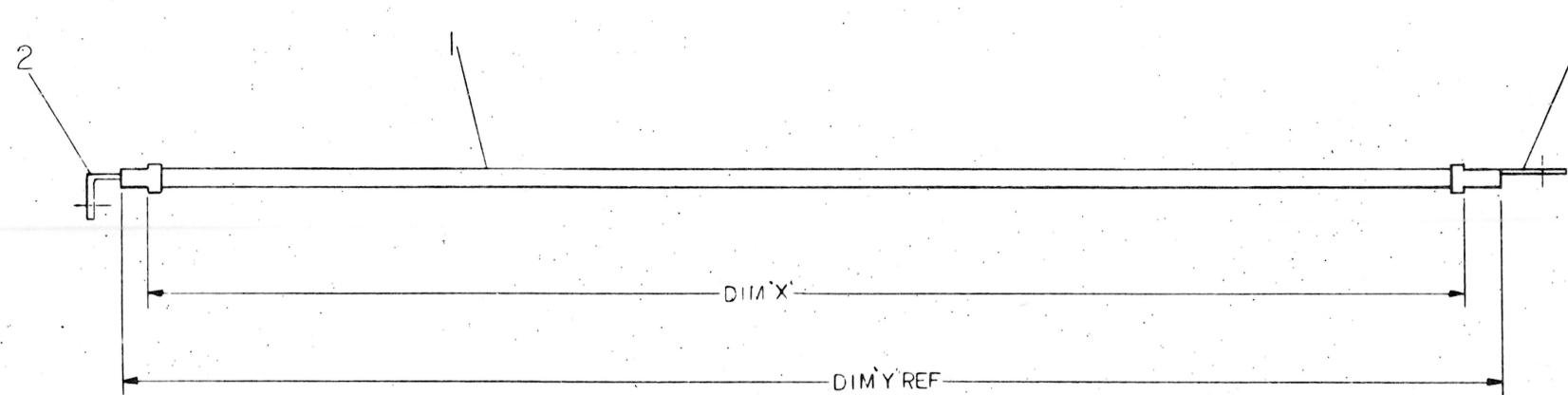
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## LEGEND

PART NO	DIM 'X' VARIATION	DIM 'Y'(PRECUT) REF
7014529-ID	IFT-3 IN ± .5IN	IFT-4IN ± .5IN
7014529-DK	ØFT-8IN ± .5IN	ØFT-9IN ± .5IN



MADE/PRINT P-1555  
REVISIONS  
CHANGE NO. REV.  
7014529 XXXXX A  
A. J. Carlson 10/27/77  
R. Martel 10/27/77

FORM NO. 100-C

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DESCRIPTION		DWG./PART NO.	ITEM NO.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
ANGLES	CLASS OF ACCURACY	NOMINAL DIMENSION RANGE INCHES	
±0° 30'		OVER 0	OVER 0.2
SURFACE QUALITY IN	(CHECK ONE)	0.2 TO 1.2	1.2 TO 4.0
MEDIUM		4.0 TO 12.0	12.0 TO 40.0
MICRONICHES	PREFERRED	±.004 ±.008 ±.012 ±.016	±.024 ±.04
QUANTITY & VARIATION		±.012 ±.016 ±.025 ±.063	
THIRD ANGLE PROJECTION		DRN. M. J. Maher 10/27/77 FIRST USED ON VAX 11/780 digital	
REMOVE BURRS AND BREAK SHARP CORNERS		CHK'D R. Martel 10/27/77 TITLE	
DO NOT SCALE DWG		NEXT HIGHER ASSY.	
MATERIAL E-U-A-11780-0-0		SIZE CODE NUMBER	
SEE PARTS LIST		D IA 7014529-0-0 A	
FINISH SCALE NONE		DIST.	
SHEET 1 OF 1			

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## WIRE TABLE

ITEM NO.	DESCRIPTION	FROM CONN	TO CONN	REMARKS
AWG	COLOR	CONN WITH	CONN WITH	
4	18	YELLOW PI-1	1&2	P2-1 1&2
5	18	VIOLET PI-2	1&2	P2-2 1&2
3	18	BLACK PI-3	1&2	P2-3 1&2

## LEGEND

NUMBER	DIM "X" VARIATION	DIM "Y" (PRE-CUT) REF
7014212-0H	ØFT-7IN ±.5IN	ØFT-8IN ±.5IN
7014212-0M	ØFT-11IN ±.5IN	1 FT-ØIN ±.5IN
7014212-1C	1 FT-3IN ±.5IN	1 FT-4IN ±.5IN
7014212-2C	2FT-3IN ±.5IN	2FT-4IN ±.5IN
7014212-2M	2FT-11IN ±.5IN	3FT-ØIN ±.5IN

## NOTES:

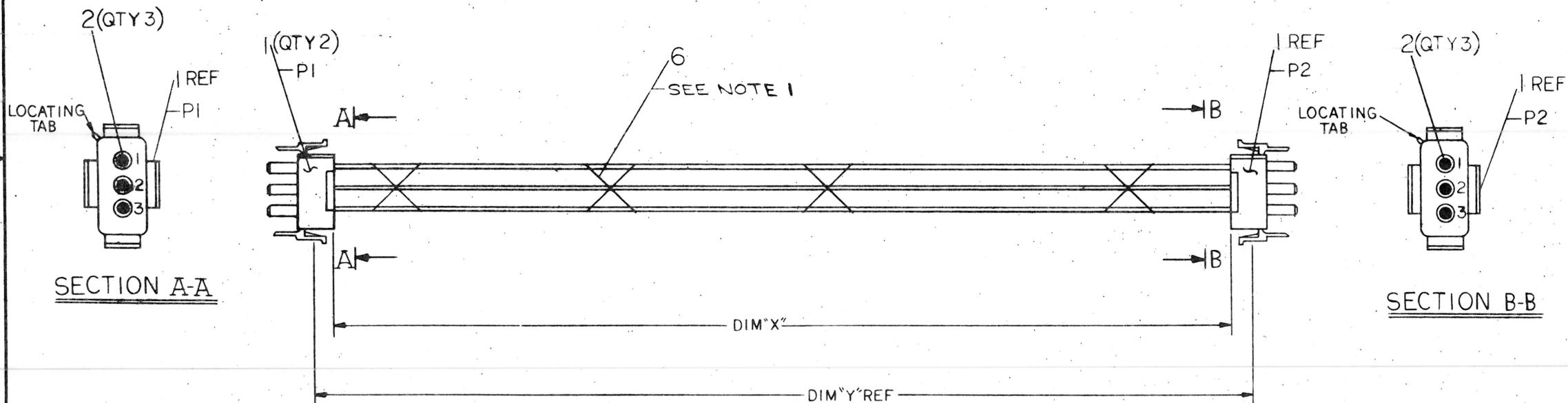
1. USE CABLE TIES (ITEM #6) APPROXIMATELY EVERY THREE (3) INCHES WHEN NECESSARY.

D

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ITEM NO.	DESCRIPTION	DWG./PART NO.
1	LABEL, CABLE IDENT.	9009532-00
AIR	TIE, CABLE	9007031-00
AIR	WIRE 18 AWG VIOLET	9107360-77
AIR	WIRE 18AWG YELLOW	9107360-44
AIR	WIRE 18AWG BLACK	9107360-00
6	SOCKET, CONTACT	12/2160-00
2	CONNECTOR, UNIVERSAL	12/2167-00

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		NOMINAL DIMENSION RANGE INCHES	
ANGLES ±0° 30'	SURFACE QUALITY IN (CHECK ONE)	CLASS OF ACCURACY	OVER 0.0 TO 0.12 0.12 TO 0.20 0.20 TO 0.40 0.40 TO 0.60 0.60 TO 0.80
		MEDIUM	±.004 ±.008 ±.012 ±.016 ±.024 ±.04
		MICRONES	±.012 ±.016 ±.025 ±.04 ±.08

REV. B	CHG. NO. 1	INV. NO. 1	DRN. 120-1000	FIRST USED ON 1/1/78
R. Martel	7014212-00001	A	CHK'D R. Martel	digit
R. Martel	7014212-00002	B	ENG'D R. Martel	1/1/78
R. Martel	7014212-00003	C	PROJ. ENGD R. Martel	1/1/78
R. Martel	7014212-00004	D	PROD'D R. Martel	1/1/78
R. Martel	7014212-00005	E	DO NOT SCALE DWG	NEXT HIGHER ASSY.
R. Martel	7014212-00006	F	MATERIAL E-UA-11780-0-0	
R. Martel	7014212-00007	G	SEE PARTS LIST	
R. Martel	7014212-00008	H	SCALE NONE	
R. Martel	7014212-00009	I	FINISH	
R. Martel	7014212-00010	J	SHEET 1 OF 1	
R. Martel	7014212-00011	K	DATE 1/1/78	
R. Martel	7014212-00012	L	REVISIONS	

REVISIONS  
CHG. NO. 1  
7014212-00001 A  
R. Martel 1/1/78  
7014212-00002 B  
R. Martel 1/1/78  
7014212-00003 C  
R. Martel 1/1/78  
7014212-00004 D  
R. Martel 1/1/78  
7014212-00005 E  
R. Martel 1/1/78  
7014212-00006 F  
R. Martel 1/1/78  
7014212-00007 G  
R. Martel 1/1/78  
7014212-00008 H  
R. Martel 1/1/78  
7014212-00009 I  
R. Martel 1/1/78  
7014212-00010 J  
R. Martel 1/1/78  
7014212-00011 K  
R. Martel 1/1/78  
7014212-00012 L  
R. Martel 1/1/78

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## WIRE TABLE

ITEM NO.	DESCRIPTION		FROM		TO		NUMBER	DIM "X" VARIATION	DIM "Y" (PRECUT) REF
	AWG	COLOR	CONN	WITH	CONN	WITH			
6	18	GRY/WHT	PI-2	1#2	P2-2	1#2	7014213-ØK	ØFT-9IN ±.5IN	ØFT-10IN ±.5IN
3	18	GRAY	PI-3	1#2	P2-3	1#2	7014213-3E	3FT-5IN ±.5IN	3FT-6IN ±.5IN
							7014213-4A	4FT-1IN ±.5IN	4FT-2IN ±.5IN

## LEGEND

## NOTES:

1. USE CABLE TIES (ITEM #4) APPROXIMATELY EVERY THREE (3) INCHES WHEN NECESSARY.

D

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REVISIONS

CHG.	CHANGE NO.	REV.
S/C	7014213-00001	A
R. Martel	25-JUN-77	
R. Martel	7014213-TV002	B
M. Carroll	12-JUNE-90	
R. Chum-SAF	25-JUN-90	
R. Chum-SAF	25-JUN-90	

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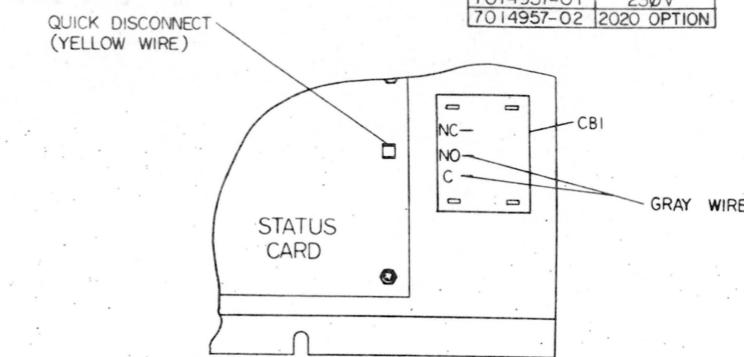
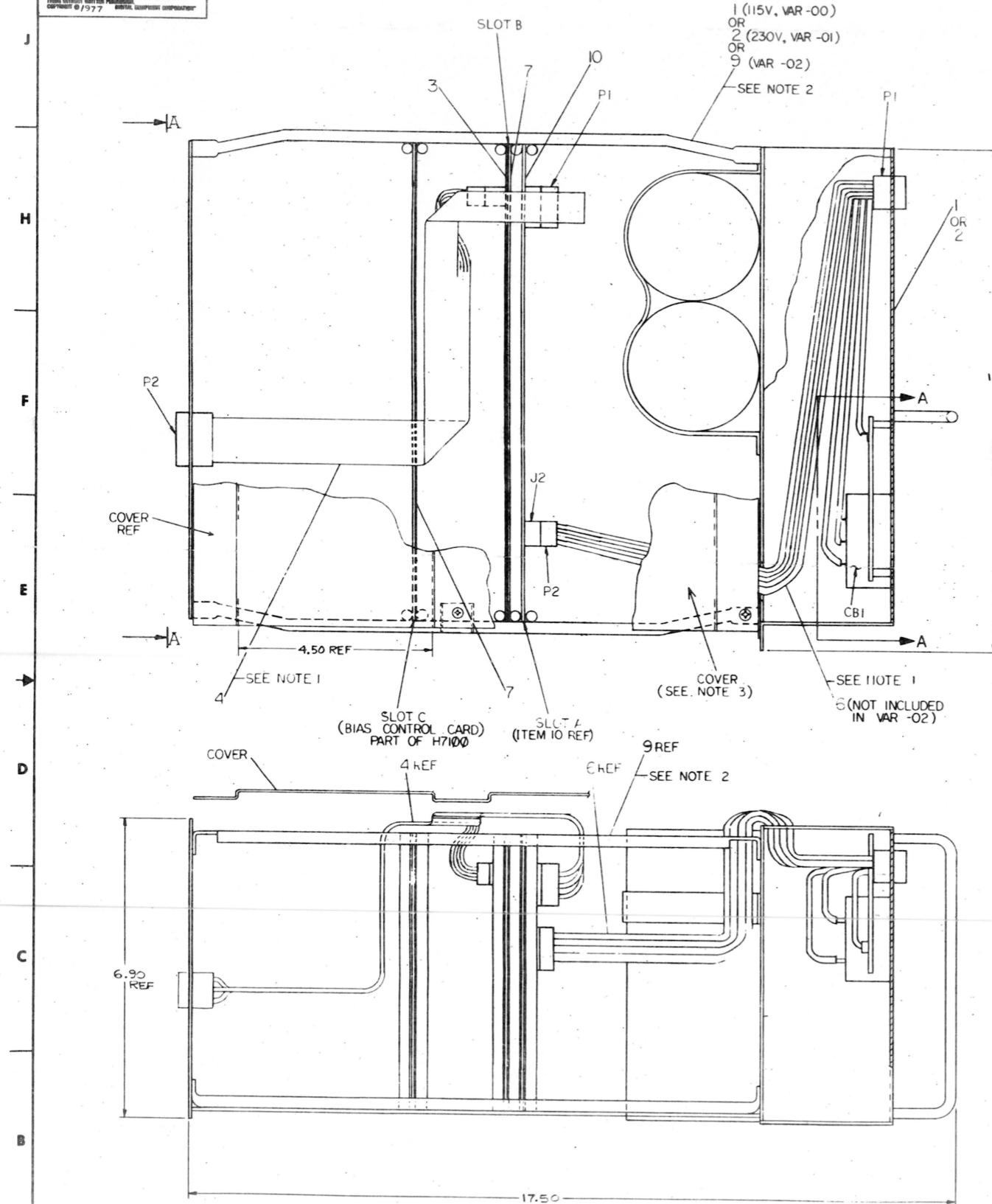
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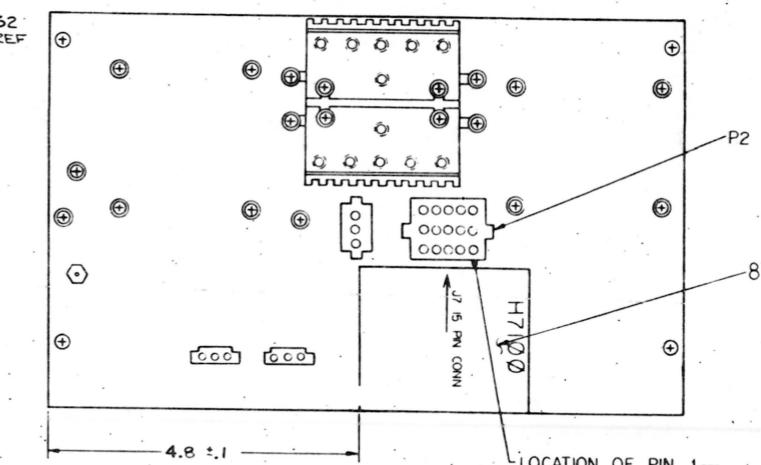
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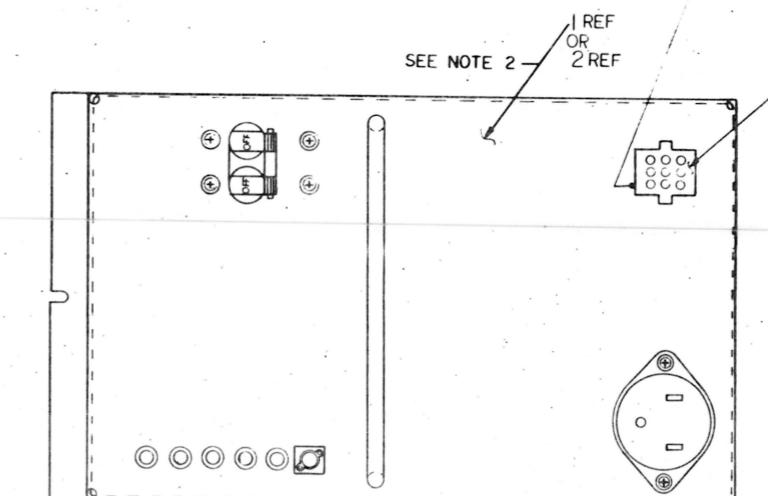
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VIEW A-A (VAR-00&-01 ONLY)  
SCALE: NONE



VIEW A



1	1	± 5VB REGULATOR CARD	D-UR-512414-0-0	10
1	-	POWER SUPPLY(H7100-A)	E-UR-H7100-B-B	9
1	1	DECAL (MEMORY OPTION)	3614762-0-1	8
2	2	ELECTROMAGNETIC SHIELD	1700021-0-4	7
-	1	HARNESS, BATTERY OPTION	L-JA7014548-0-0	6
1	1	HARNESS ± 5VB	1700165-0-0	4
1	1	+12V REGULATOR	L-U-A-512414-0-0	3
-	1	POWER SUPPLY(H7100-B)	E-UR-H7100-B-B	2
-	1	POWER SUPPLY(H7100-A)	E-UR-H7100-A-A	1
02	01	DESCRIPTION	DRG. NO. PART NO.	ITEM NO.

- - -		POWER SUPPLY(H710P-A-E-UR-H710P-A)	
7014957-02 TO14957-01		DESCRIPTION DWG./PART NO. ITEM NO.	
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
ANGLES HGT 30° SURFACE CHECK ONE		CLASS OF ACCURACY NOMINAL DIMENSION RANGE INCHES	
QUANTITY & VARIATION		TOOL	0.04 0.12 0.17 0.25 0.35 0.50 0.13 0.35 0.50 0.60 0.80 1.00 0.17 0.50 0.60 0.80 0.90 1.00
MICRONOMICS		MEDIUM	2.004 ±0.004 0.815 ±0.015 4.816 ±0.004 2.260 ±0.004
PREFERRED (✓)			0.812 ±0.004 0.825 ±0.004 0.816 ±0.004 0.820 ±0.004
DRAWN BY CNC'D BY ENG'D BY PROJ. ENGR. PROD. ENGR.		FIRST USED ON VAX 11/780	
REVERSE BURRS AND BREAK SHARP CORNERS		TITLE	
DO NOT SCALE DRAW		SUPPLY, MEMORY OPTION	
MATERIAL		NEXT HIGHER AMT.	
EE PARTS LIST		E-LIA-1780-0-0	
SHEET OF		SIZE CODE	NUMBER
1		AD 7014957-0-0 REV. A	
		DRAFT.	